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SELECTED INTERNAL HELICOPTER HARDPOINTS

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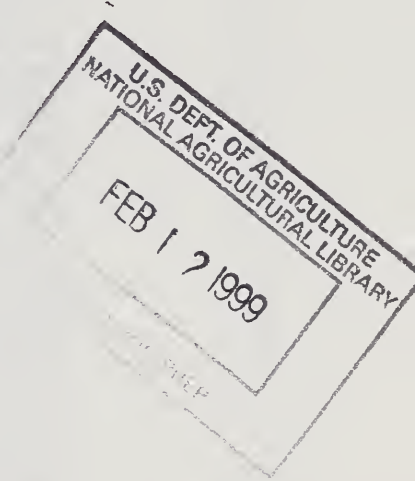
SELECTED INTERNAL HELICOPTER HARDPOINTS

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INTRODUCTION

Location and basic load bearing capacity of specified internal cargo points of Bell 205A, 212 and 214B helicopters (Bell Helicopter Textron, Ft. Worth, TX) are presented in this report. Limited information regarding location of fittings and cargo loading restrictions for McDonnell Douglas MD500C, 500D, and 500E (McDonnell Douglas Helicopter Co., Mesa, AZ), and Bell 206 and 412 helicopters is also given. Standard tiedown hardware and locations are provided, if information available. The information provided in this report is intended to assist in the safe use of internal attach points of the helicopters discussed. If any doubt exists for a specific application or loading of these locations, the helicopter manufacturer should be consulted.

GENERAL BACKGROUND

A review of engineering statics and definitions of terminology is presented here to avoid misunderstandings about the use of the maximum load tables that are presented in this report. Each attach point has a "normal" direction perpendicular to, and a "shear" direction parallel to, the surface. The directions of normal and shear have nothing to do with aircraft axes; i.e., up, down, forward, etc. Normal and shear apply to the surface to which the loads will be applied.

Loads appearing in the tables, other than normal and shear loads, are to be applied with respect to aircraft axes as noted. These directions are vertical, longitudinal, or lateral for forces of R_{VERT} , R_{LONG} , and R_{LAT} , respectively. The normal force R_N is always perpendicular (normal) to the attach point surface; the shear force R_S is parallel to the plane of the attach point surface. Therefore, for floor and roof fittings $R_N = R_{VERT}$, for bulkheads $R_N = R_{LONG}$, and for walls $R_N = R_{LAT}$. Also, for floor and roof fittings, $R_S = R_{LAT}$ or R_{LONG} (or any other force in the horizontal plane), for bulkheads $R_S = R_{LAT}$ or R_{VERT} , and for walls $R_S = R_{LAT}$ or R_{VERT} , and for walls $R_S = R_{LONG}$ or R_{VERT} .

USE OF TABLES

For the Bell floor fittings described in Table 1, all loads are expressed as normal to or parallel to (shear) the attach surface, or as a resultant load. The resultant is the vector sum of the normal and shear loads. The angle the resultant makes with the normal to the surface is defined as \emptyset . From engineering mechanics, a load can be represented either as the resultant (R) or by its components. Hence,

$$R_N = R \cos \emptyset, R_S = R \sin \emptyset \text{ and } R = \sqrt{R_S^2 + R_N^2}.$$

R may be positive (tensile) or negative (compressive); the same load limitations on the aircraft apply. As long as either criterion I or criterion II is satisfied, the application is within the design limits of the aircraft.

An Example: Suppose a fastener on the floor has an upward load of 1500 lb, a forward load of 750 lb, and a 500 lb load toward the RHS of the aircraft. Then,

$$R_S = \sqrt{750^2 + 500^2} = 901 \text{ lb (total shear load),}$$

$$\text{and } R_N = 1500 \text{ pounds. Furthermore,}$$

$$R = \sqrt{1500^2 + 901^2} = 1750 \text{ pounds.}$$

Is location 1, table A, an acceptable alternative? Refer to figure 1 for illustrated loads R, R_S , and R_N , and angle \emptyset . Criterion I cannot be used, since $\emptyset > 30^\circ$ ($\tan \emptyset = R_S/R_N$), therefore criterion II governs. Since 1500 lb is less than 1730 lb and 901 lb < 1250 lb, this loading is acceptable.

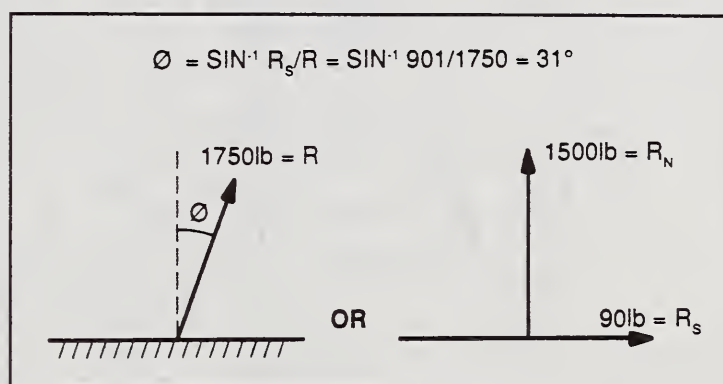


Figure 1. Load diagrams.

Example Table A.
Locations and maximum static loads.

LOCATION	CRITERION I R(lb), \emptyset	CRITERION II R_N & R_S MAX (lb)
Maximum resultant and limitation		
1	2500, $\emptyset \leq 30^\circ$	1730, 1250

For the bulkhead, wall, and roof fittings in tables 2, 3 and 4, criterion II loading combinations are dependent upon aircraft axes directions. Criterion I loadings are normal and shear combinations as in table 1, except where a general shear load does not apply. Again, if either criterion I or II is satisfied, the loading is within the aircraft design limits. Both criteria describe maximum combined loading. Load combinations from criterion I and II cannot be mixed.

Bell 205A, 212 AND 214B ATTACH POINTS AND MAXIMUM STATIC LOADS

Tables 1 through 4 of internal hardpoint data are for Bell 205A, 212 and/or 214B helicopters, as noted. These data were obtained from Bell report No. 205-099-205, Rev. C, dated August 5, 1975. Floor plan views of attach point locations for the 205A and 212 are shown in figures 2 and 3. According to Bell product data books, the Bell 212 and 412 baggage compartment and cargo floor have loading capacities of 32.3 lb/ft² and 100 lb/ft², respectively.

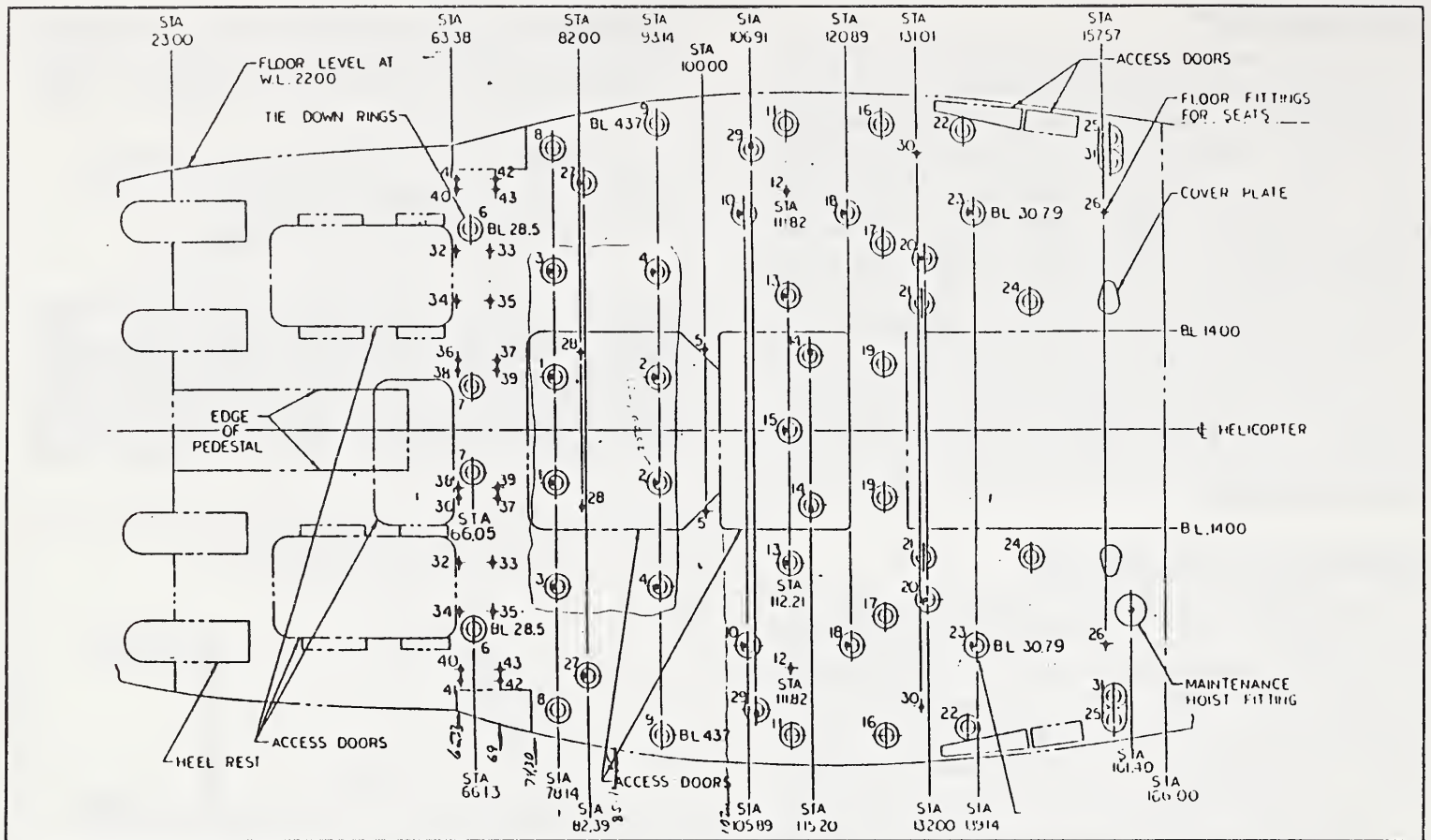


Figure 2. Bell 205A floor plan.

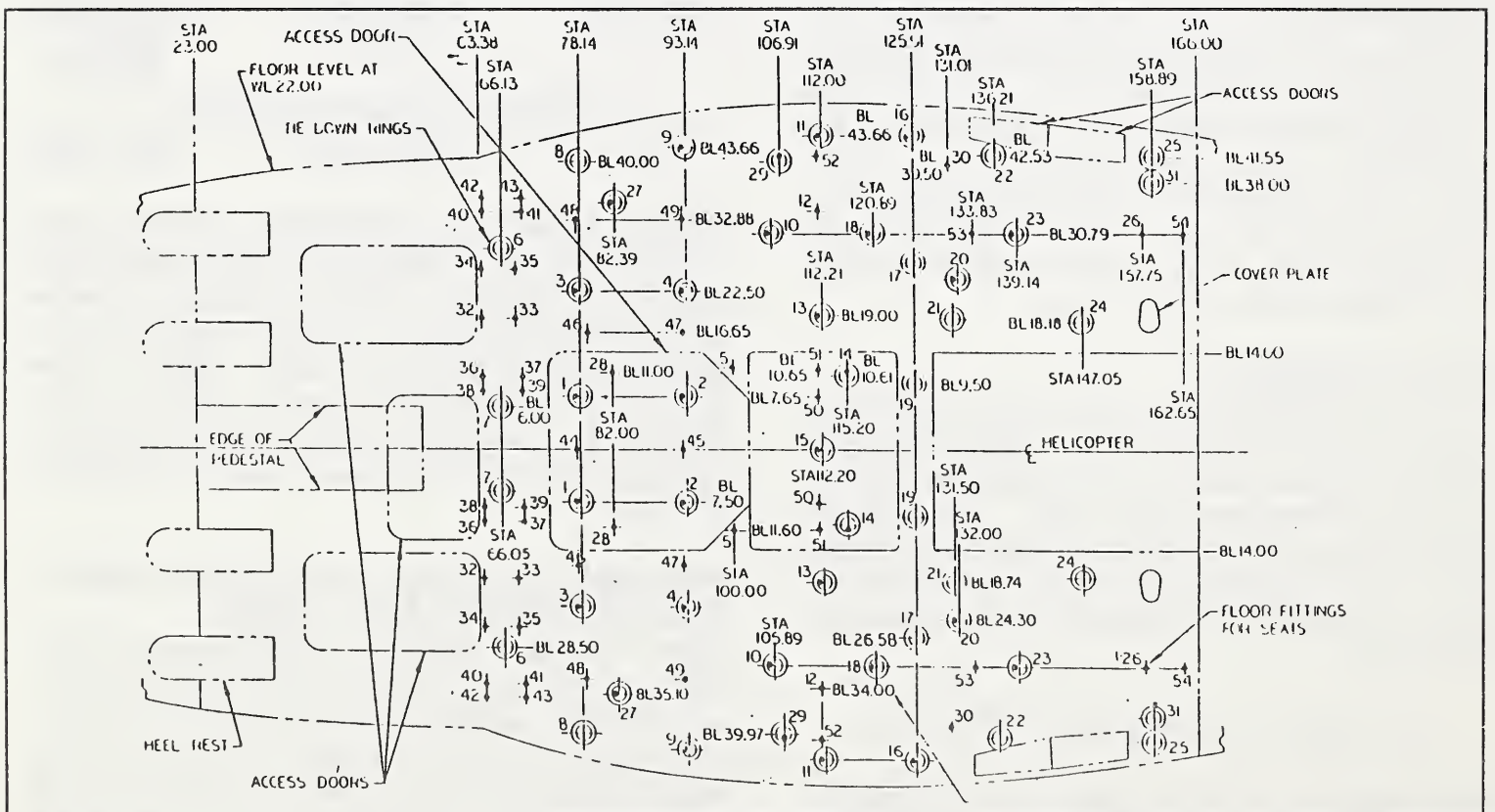


Figure 3. Bell 212 floor plan

Table 1.
Bell 205A and 212 floor fittings locations and maximum static loads.

LOCATION	CRITERION I R _N & R _S Maximum (lb) Maximum resultant and limitation		CRITERION II R(lb), Ø
1	2500	1700	N/A
2	2500	1700	N/A
3	2500	1700	N/A
4	2500	1700	N/A
5	1250	500	N/A
6	1250	500	N/A
7	1250	500	N/A
8	1250	500	N/A
9	2150	1250	2500, Ø≤30°
10	2150	1250	2500, Ø≤30°
11	2150	1250	2500, Ø≤30°
12	2150	1250	2500, Ø≤30°
13	2150	1250	2500, Ø≤30°
14	2150	1250	2500, Ø≤30°
15	2150	1250	2500, Ø≤30°
16	2150	1250	2500, Ø≤30°
17	1250	500	N/A
18	2150	1250	2500, Ø≤30°
19	1250	500	N/A
20	2150	1250	2500, Ø≤30°
21	1250	500	N/A
22	1250	500	N/A
23	2150	1250	2500, Ø≤30°
24	1250	500	N/A
25	1250	500	N/A
26	2150	1250	2500, Ø≤30°
27	2150	1250	2500, Ø≤30°
28	2150	1250	2500, Ø≤30°
29	2150	1250	2500, Ø≤30°
30	2150	1250	2500, Ø≤30°
31	1250	500	N/A
* 32	1250	500	N/A
* 33	1250	500	N/A
* 34	1250	500	N/A
* 35	900	650	N/A
* 36	900	650	N/A
* 37	900	650	N/A
* 38	900	650	N/A
* 39	900	650	N/A
* 40	900	650	N/A
* 41	900	650	N/A
* 42	900	650	N/A
* 43	900	650	N/A
44	2500	1700	N/A
45	2500	1700	N/A
46	2500	1700	N/A
47	2500	1700	N/A
48	2500	1700	N/A
49	2500	1700	N/A
50	2150	1250	2500, Ø≤30°
51	2150	1250	2500, Ø≤30°
52	2150	1250	2500, Ø≤30°
53	2150	1250	2500, Ø≤30°
54	2150	1250	2500, Ø≤30°

NOTE * For 205A: Loads to floor attach points 32 to 43 are from pilot and co-pilot inertia reel and seat belt fittings. From the Bell report for 212 helicopters, the loads still apply— but the points are provisional only.

SEAT FITTING
2 PLACES

HELI-COPTER

LIGHT SWITCH

EXISTING STUDS FOR
SOUND PROOFING BLANKET

EXISTING INSERTS

W.L. 70.05

WL 68.5

WL 62.7

WL 60.1

WL 56.7

WL 55.4

WL 51.3

WL 46.1

WL 45.7

WL 44.1

WL 40.2

WL 34.6

WL 29.0

WL 24.2

W.L. 22.00

BL 20.6

BL 29.7

BL 36.6

BL 21.7

BL 31.0

BL 16.7

BL 24.4

BL 32.0

BL 39.6

BL 21.5

BL 30.8

BL 20.6

BL 31.1

BL 8.96

BL 8.88

BL 14.00

BL 14.00

WL 54.4

WL 35.7

WL 35.7

SEAT BELT RING
2 PLACES

SEAT FITTINGS

HEATER OUTLET

LITTER

570-705

23

23

2

2

3

3

1

1

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11

12

13

14

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VIEW LOOKING AFT - STA 129.00 AND 166.00

VIEW LOOKING AFT - STA 129.00 AND 166.00

4

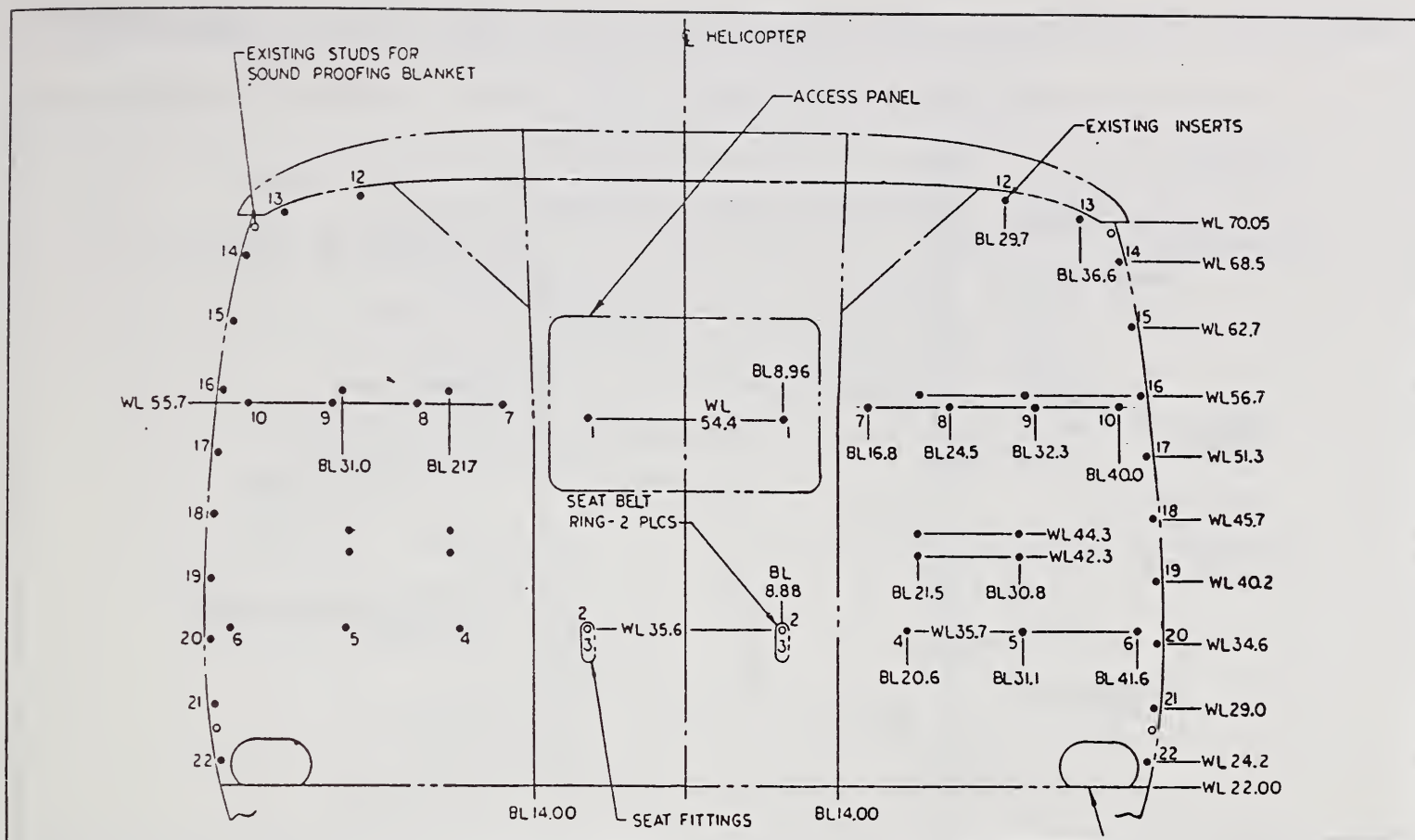


Figure 6. Bell 214B bulkhead stations 129 & 166.

Table 2.
Bell 205A, 212 and 214B bulkhead stations 129 and 166 fittings locations and maximum static loads.

LOCATION	CRITERION I R_N & R_S Maximum (lb)		CRITERION II R_{VERT} & R_{LAT} Maximum (lb)
* 1	1250	500	N/A, since R_{VERT} & R_{LAT} are R_S (see Crit. I) 1440, 1440 & R_N Maximum = 1440 1000, 0 or 0, 1000
* 2	1440	1440	
* 3	1760	0	
4	1250	500	
5	1250	500	N/A
6	1250	500	N/A
7	1250	500	N/A
8	1250	500	N/A
9	1250	500	N/A
10	1250	500	N/A
** 11	1250	1250	N/A
12	1250	1250	N/A
13	1250	1250	N/A
14	900	300	N/A
15	900	300	N/A
16	900	300	N/A
17	900	300	N/A
18	900	300	N/A
19	900	300	N/A
20	900	300	N/A
21	900	300	N/A
22	900	300	N/A
23	778		1110 778
OR,		R_{VERT} Maximum = 1110 R_{LAT} Maximum = 778	
	0		

NOTE: * Points 1, 2, and 3 are for STA 129.00; all other points are at STA 166.00 **Points 11 and 23 applicable to 205A only.

Locations of B.L. 14.00 wall fittings for 205A, 212 and 214B described in Table 3 are shown in figures 7 thru 12.

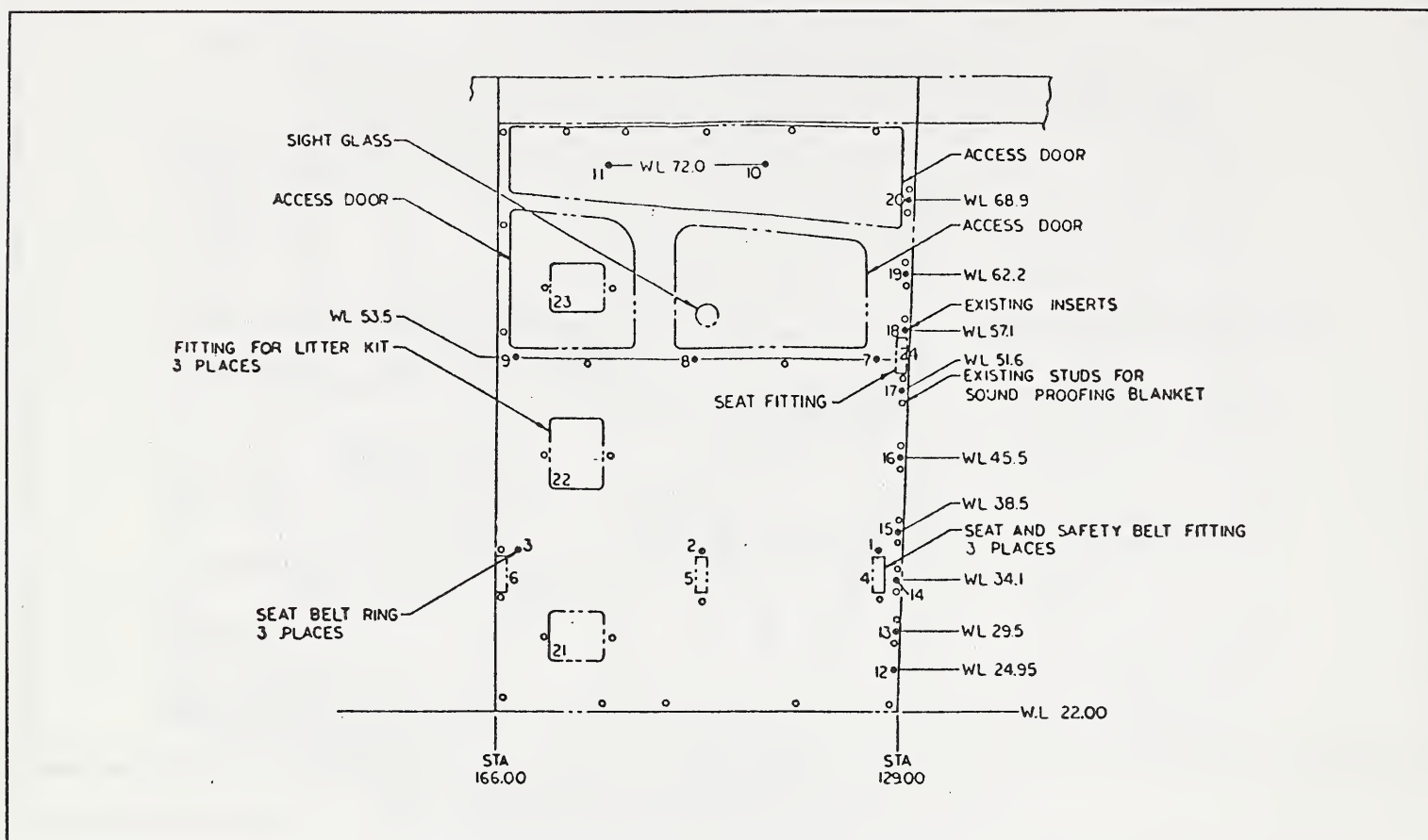


Figure 7. Bell 205A B.L.14 righthand wall fittings.

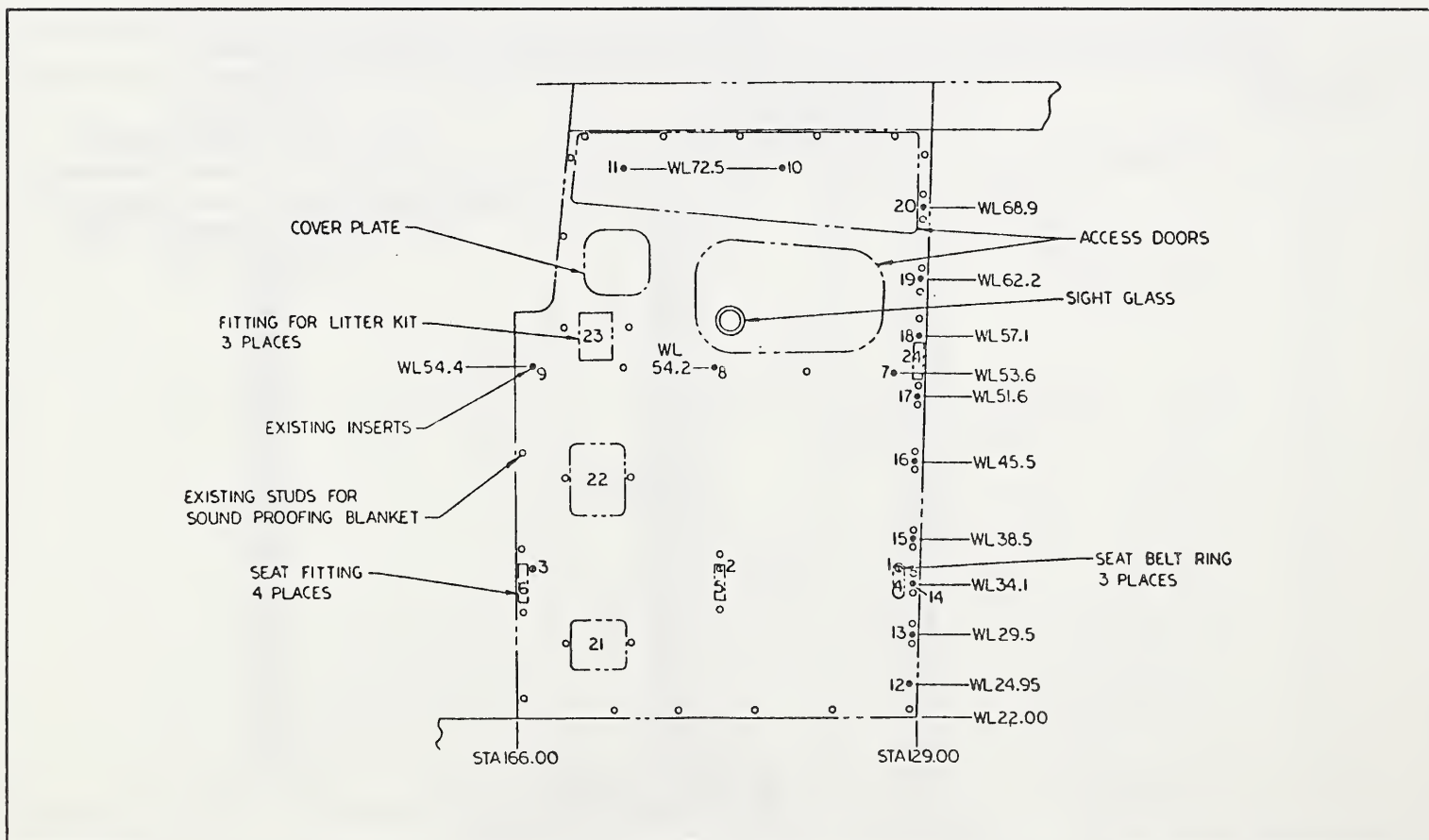


Figure 8. Bell 212 B.L.14 righthand wall fittings.

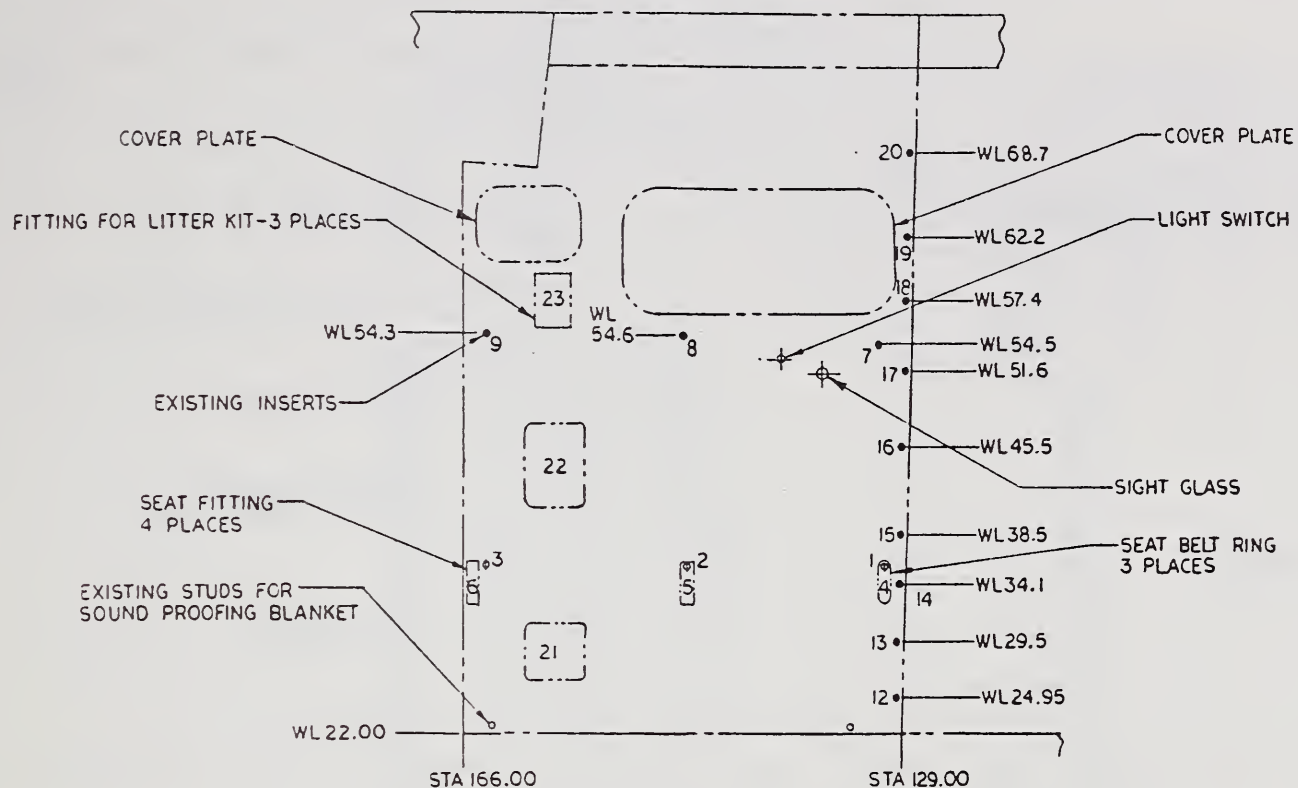


Figure 9. Bell 214B B.L. 14 righthand wall fittings.

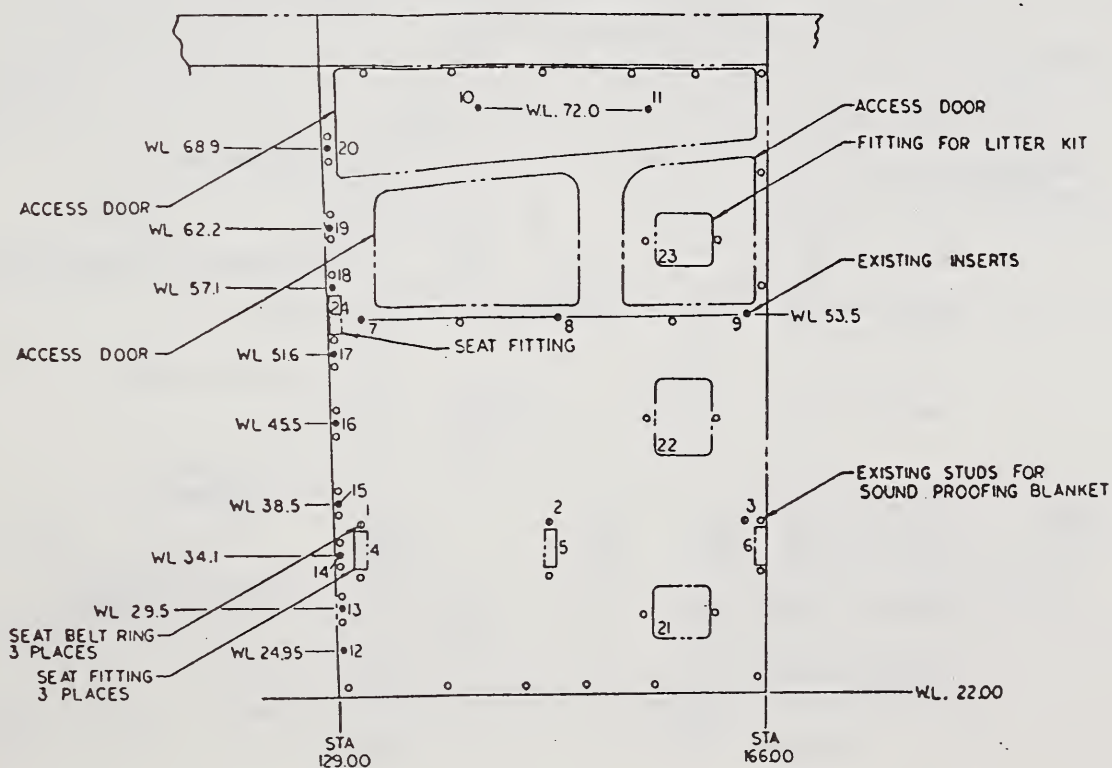


Figure 10. Bell 205A B.L. 14 lefthand wall fittings.

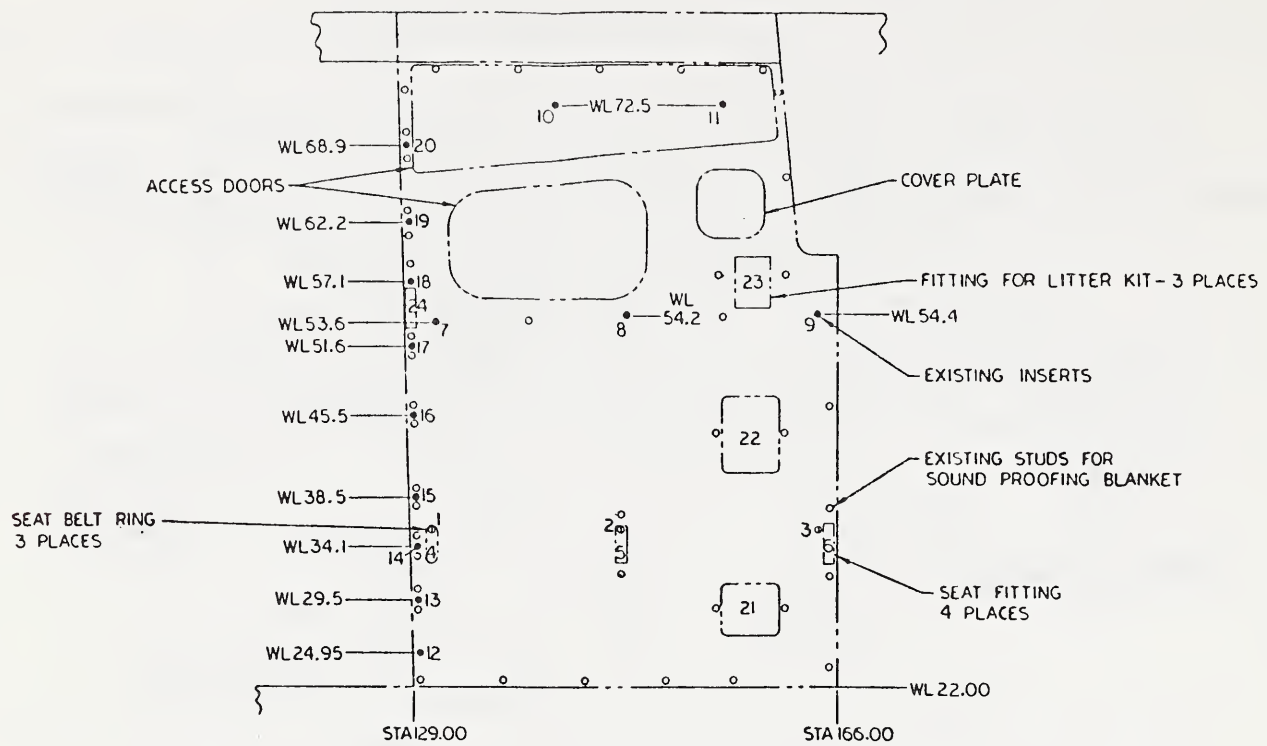


Figure 11. Bell 212 B.L. 14 lefthand wall fittings.

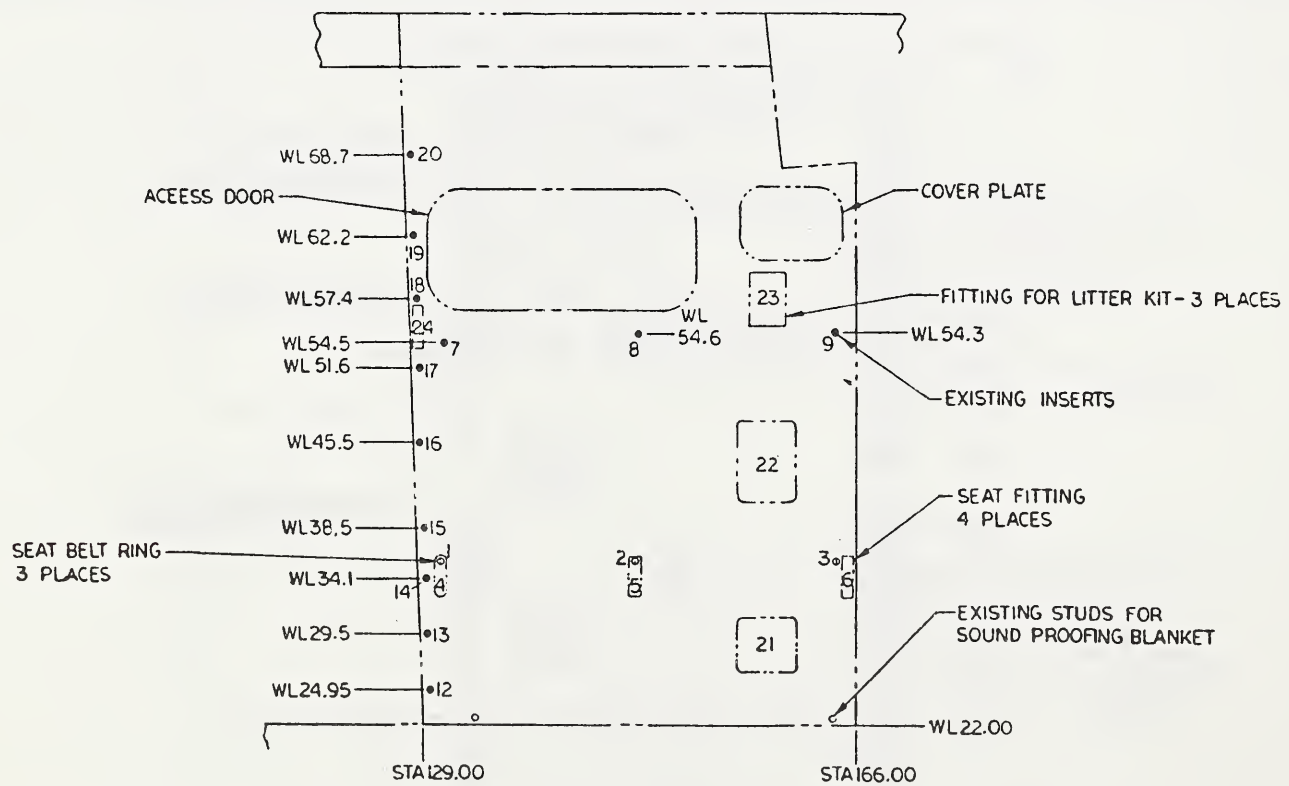


Figure 12. Bell 214B B.L. 14 lefthand wall fittings.

Table 3.
Bell 205A, 212 and 214B B.L.14 wall fittings locations
and maximum static loads.

LOCATION	CRITERION I		CRITERION II	
	R_N & R_S Maximum (lb)		R_{VERT}	R_{LONG} Maximum (lb)
1	1400	1400	1440	1440 & R_N Max. = 1440
2	1400	1400	1440	1440 & R_N Max. = 1440
3	1400	1400	1440	1440 & R_N Max. = 1440
4	1760	0	1000	0
OR	0	2160	0	2160
	0	0	1375	0
	0	0	450	0
5	1250	500 & R_{VERT} = 500	N/A	
6	1250	500 & R_{VERT} = 500	N/A	
7	1250	500 & R_{VERT} = 500	N/A	
8	1250	500 & R_{VERT} = 500	N/A	
9	1250	500 & R_{VERT} = 500	N/A	
10	1250	500 & R_{VERT} = 500	N/A	
11	1250	500 & R_{VERT} = 500	N/A	
12	1650	1650 & R_{VERT} = 1650	N/A	
13	1650	1650 & R_{VERT} = 1650	N/A	
14	1650	1650 & R_{VERT} = 1650	N/A	
15	1650	1650 & R_{VERT} = 1650	N/A	
16	1650	1650 & R_{VERT} = 1650	N/A	
17	1650	1650 & R_{VERT} = 1650	N/A	
18	1650	1650 & R_{VERT} = 1650	N/A	
19	1650	1650 & R_{VERT} = 1650	N/A	
20	1650	1650 & R_{VERT} = 1650	N/A	
21	1000	0 & R_{VERT} Max. = 500	500	1000
22	1000	0 & R_{VERT} Max. = 500	500	1000
23	1000	0 & R_{VERT} Max. = 500	500	1000
* 24	778	778	1110	778

NOTE: Location 24 applies to attachmnets only.

Location of 205A, 212 and 214B roof fittings described in table 4 are shown in figures 13 through 18.

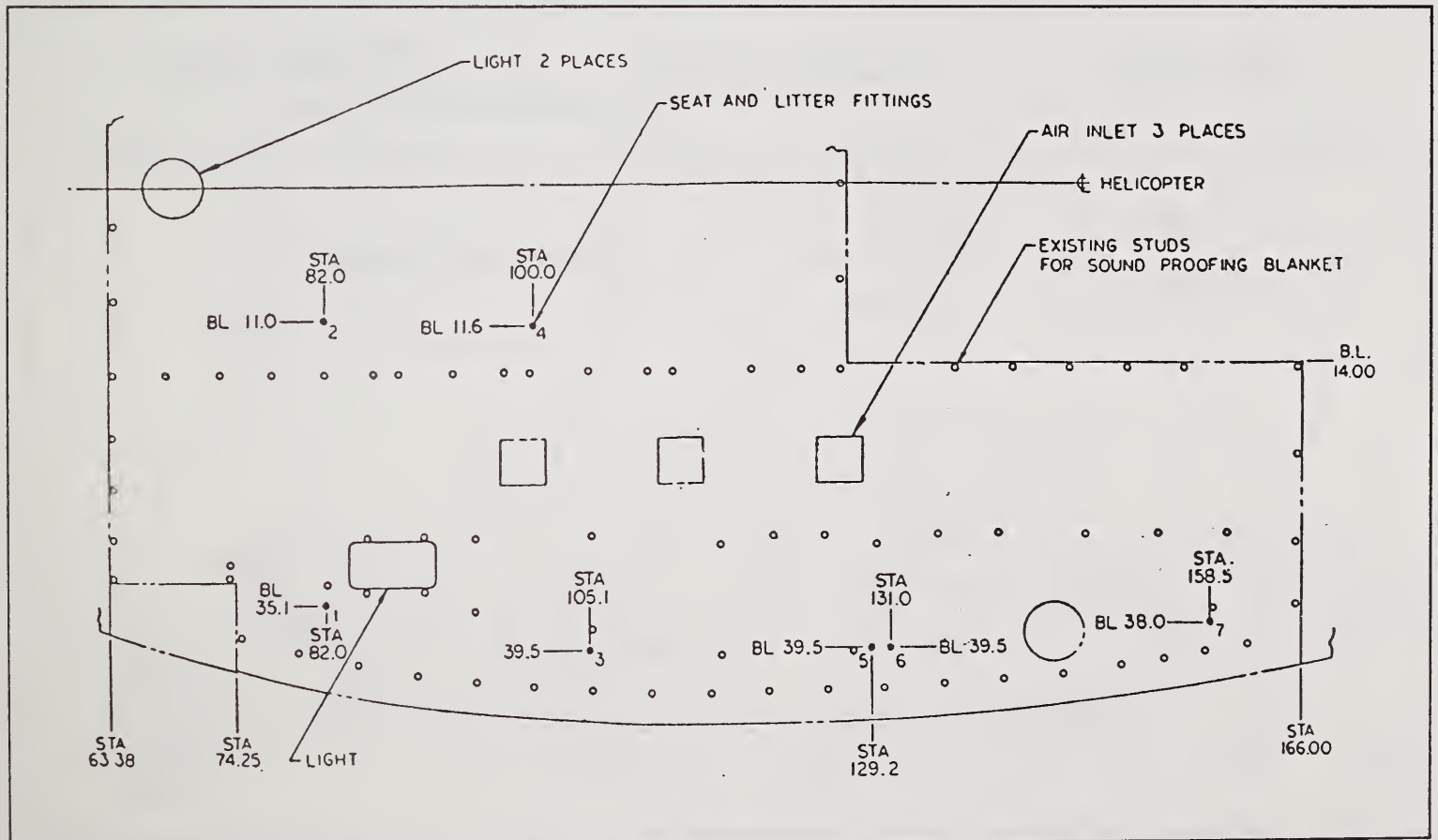


Figure 13. Bell 205A righthand roof fittings.

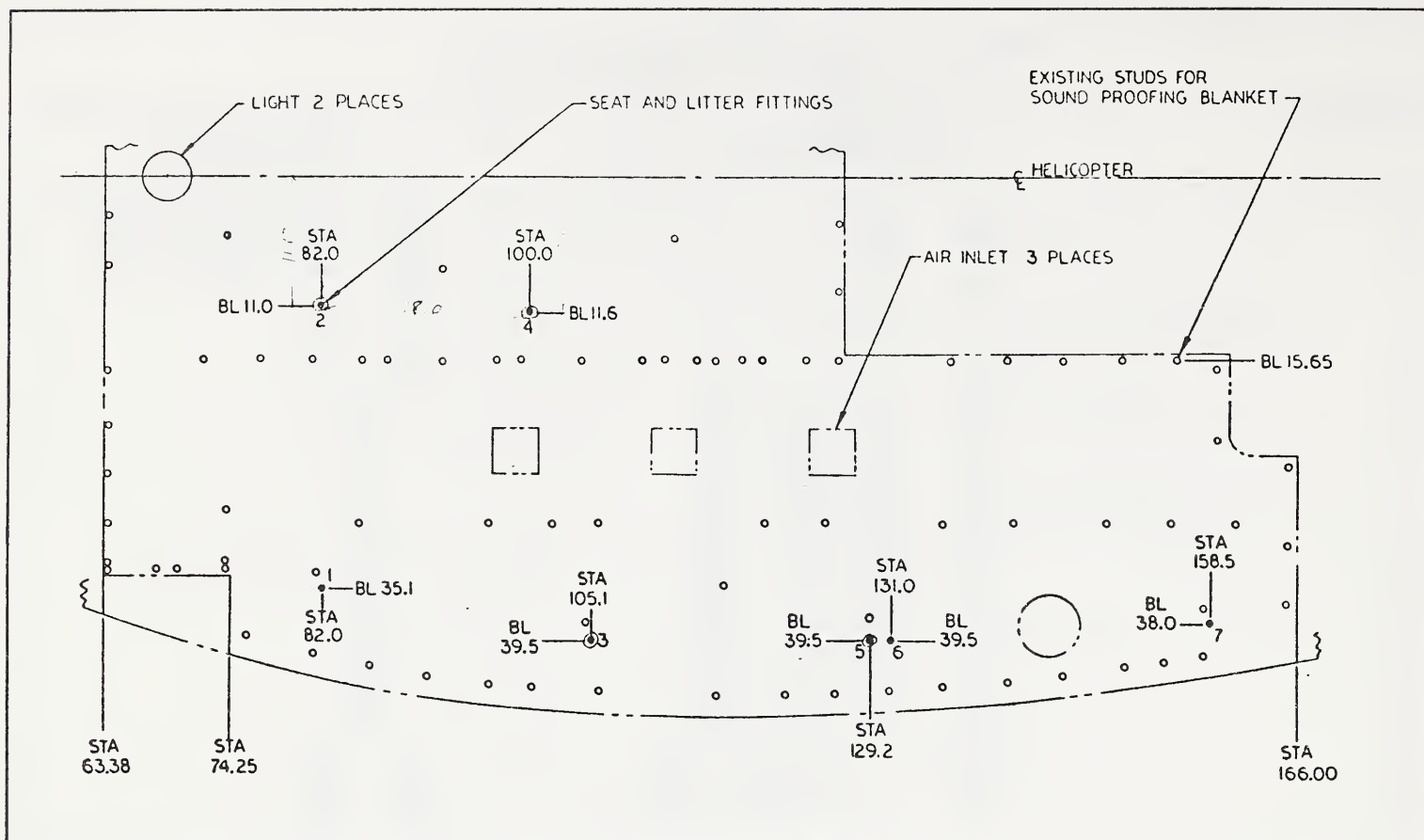


Figure 14. Bell 212 righthand roof fittings.

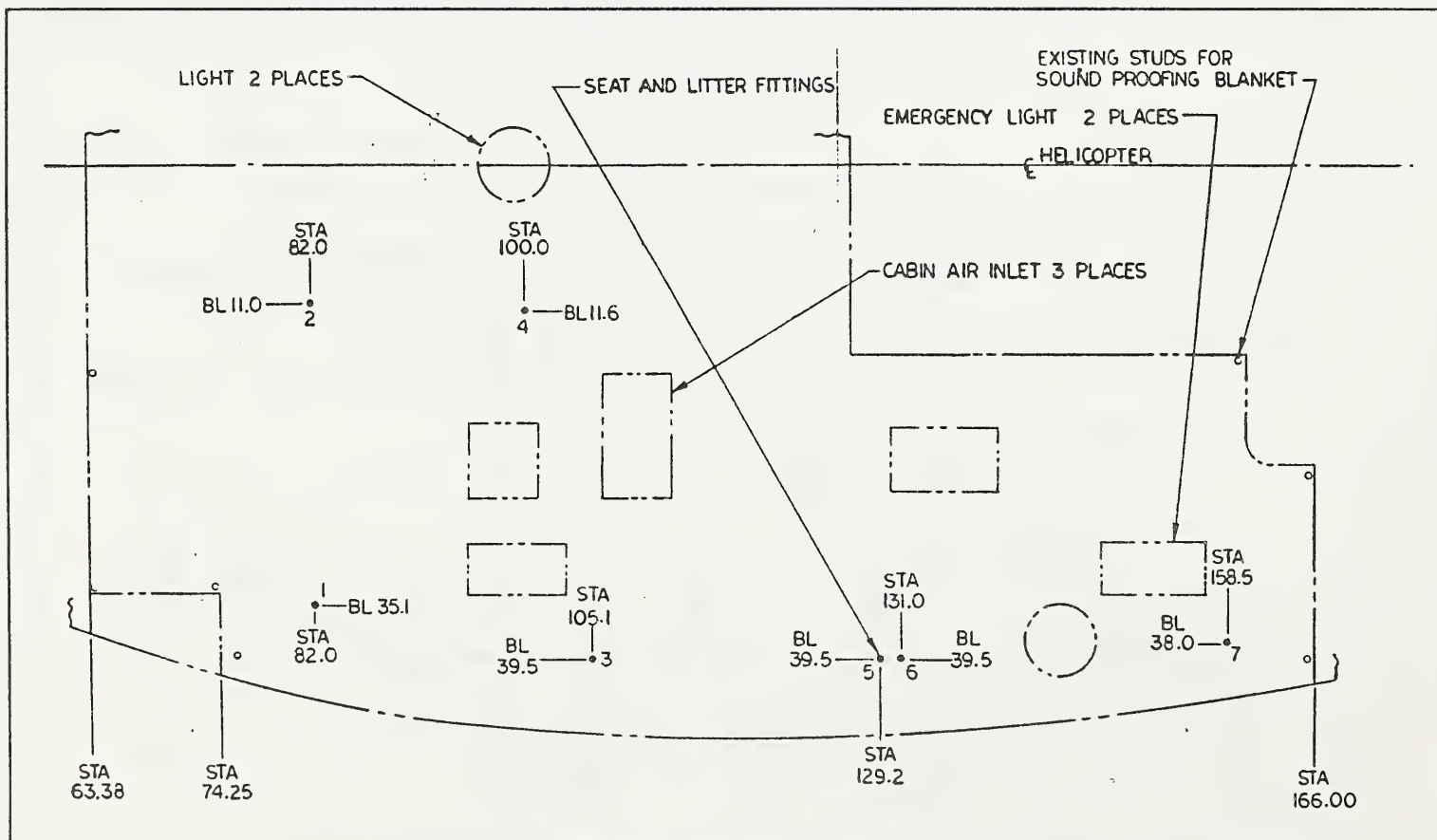


Figure 15. Bell 214B righthand roof fittings.

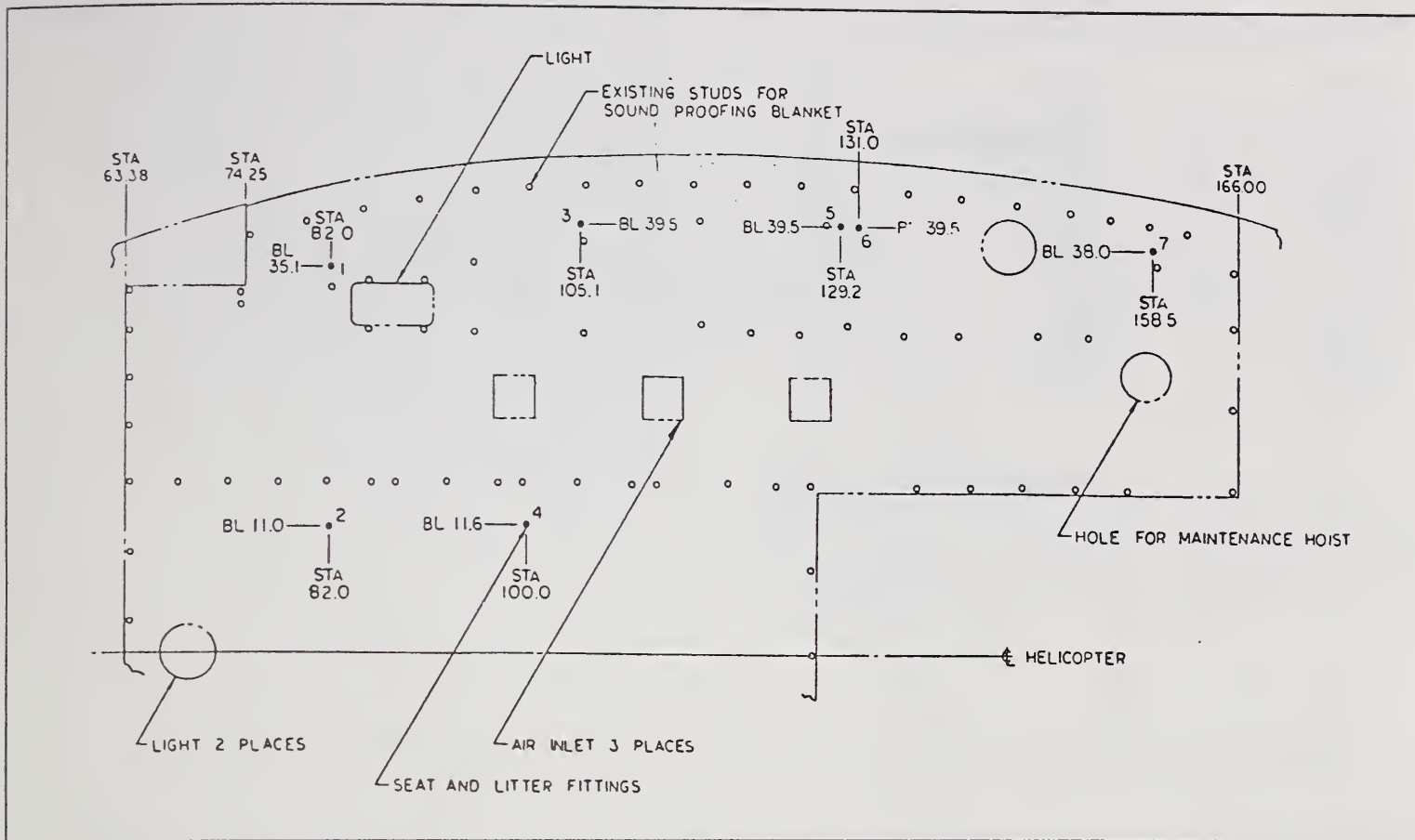


Figure 16. Bell 205A lefthand roof fittings.

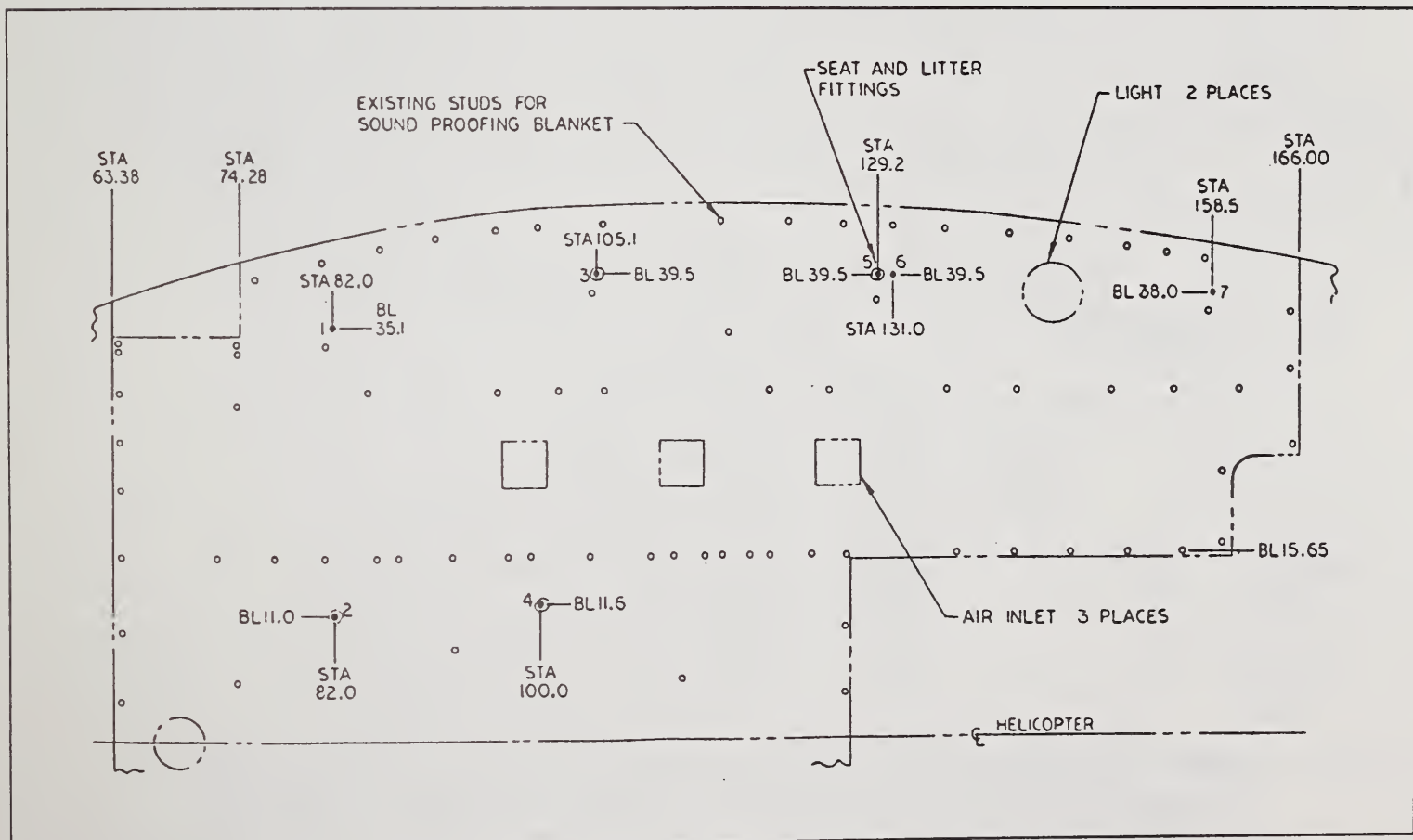


Figure 17. Bell 212 lefthand roof fittings.

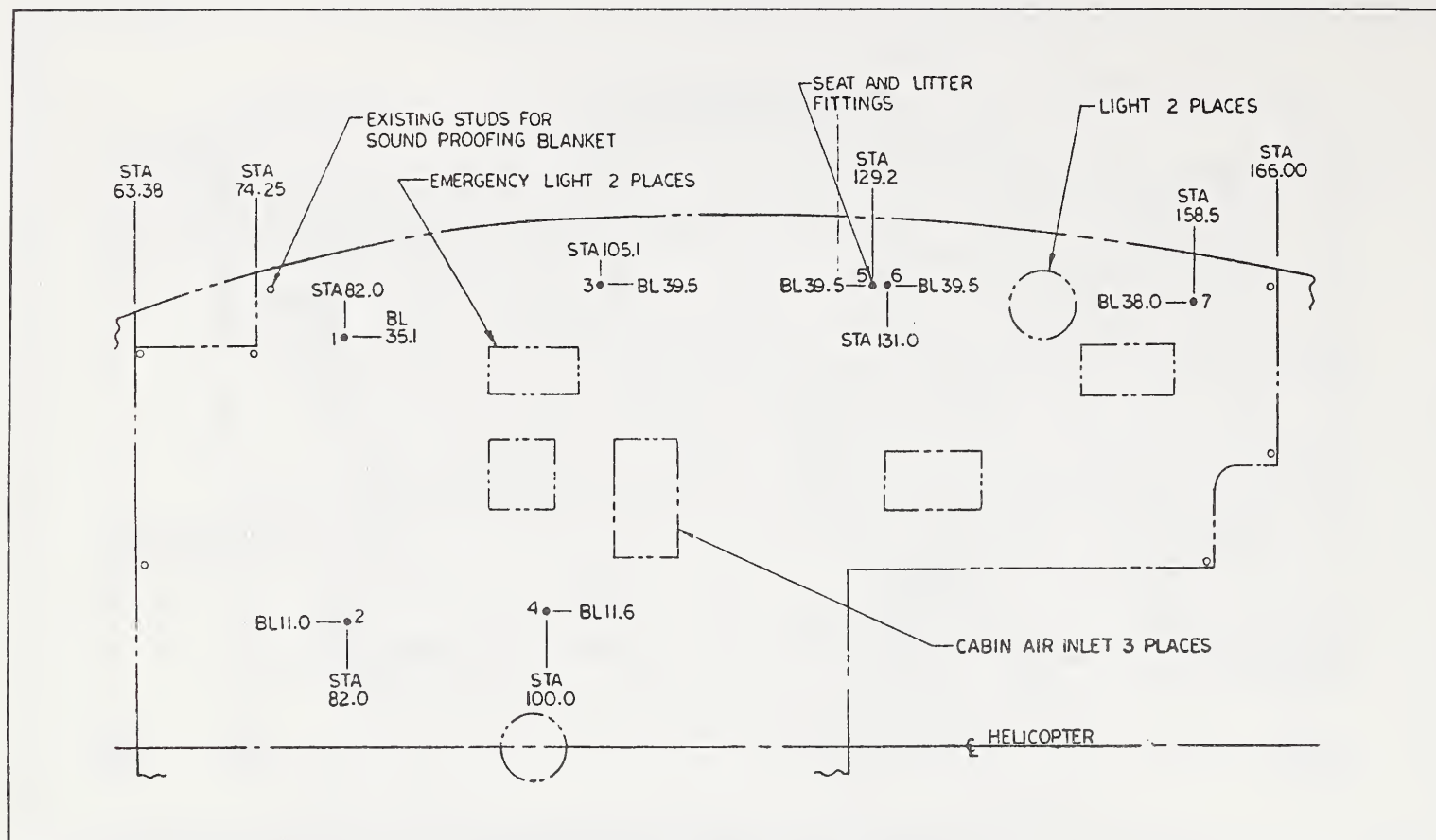


Figure 18. Bell 214B lefthand roof fittings.

Table 4
Bell 205A, 212, and 214B roof fittings locations and maximum static loads.

LOCATION		CRITERION I R_N & R_S Maximum (lb)	
1		1500	R_{LONG} Max. = 370
	OR	1500	R_{LAT} Max. = 1130
	OR	0	R_{LONG} Max. = 370, R_{LAT} Max. = 1130
2		1250	1250
3		1500	(R_{LONG} Max. = 344, R_{LAT} Max. = 647, R_S = 733)
4		1250	1250
5		(722)	1250
6		0	1250
7		1500	0

NOTE: The bracketed values for roof points 3 and 5 of table 4 were computed for the Bell 212 rappelling operation by San Dimas Technology and Development Center (SDTDC) per letter MS-9730, dated February 28, 1979. These values were based on a 3.75 safety factor.

HARDPOINT STRENGTHS OF ALL BELL MODELS

(NOTE: Further verification from Bell engineering may be needed before the following general criteria are used.)

According to the Bell Textron factory, the following statement applies to all Bell helicopter internal hardpoints for which standard AN3 (No. 10) or larger hardware could be attached. When either a shear or normal load is applied (or combination of both), the aircraft are designed so that the hardware will fail before there is any structural damage. This is not valid if *any* moment is applied. It should be emphasized that this is only true when considering standard AN hardware, *not* high strength hardware. Table 5 provides the tensile and shear strengths of standard steel AN bolts, from AN3 to AN10 inclusive. The values are from USAF T.O. 1-1A-8 table 3-1, change 26, 1 July 1969.

Table 5.
Tensile and shear strengths of standard steel AN bolts.

AN Number	Tensile (lb)	Shear (lb)
3	2210	2125
4	4080	3680
5	6500	5750
6	10,100	8280
7	13,600	11,250
8	18,500	14,700
9	23,600	18,700
10	30,100	23,000

BELL 212 HARDWARE

Bell 212 floor installations with hardware listings are shown in figures 19 through 27. These data are taken from the Bell 212 Illustrated Parts Catalog BHT-212-IPC, dated April 15, 1985.

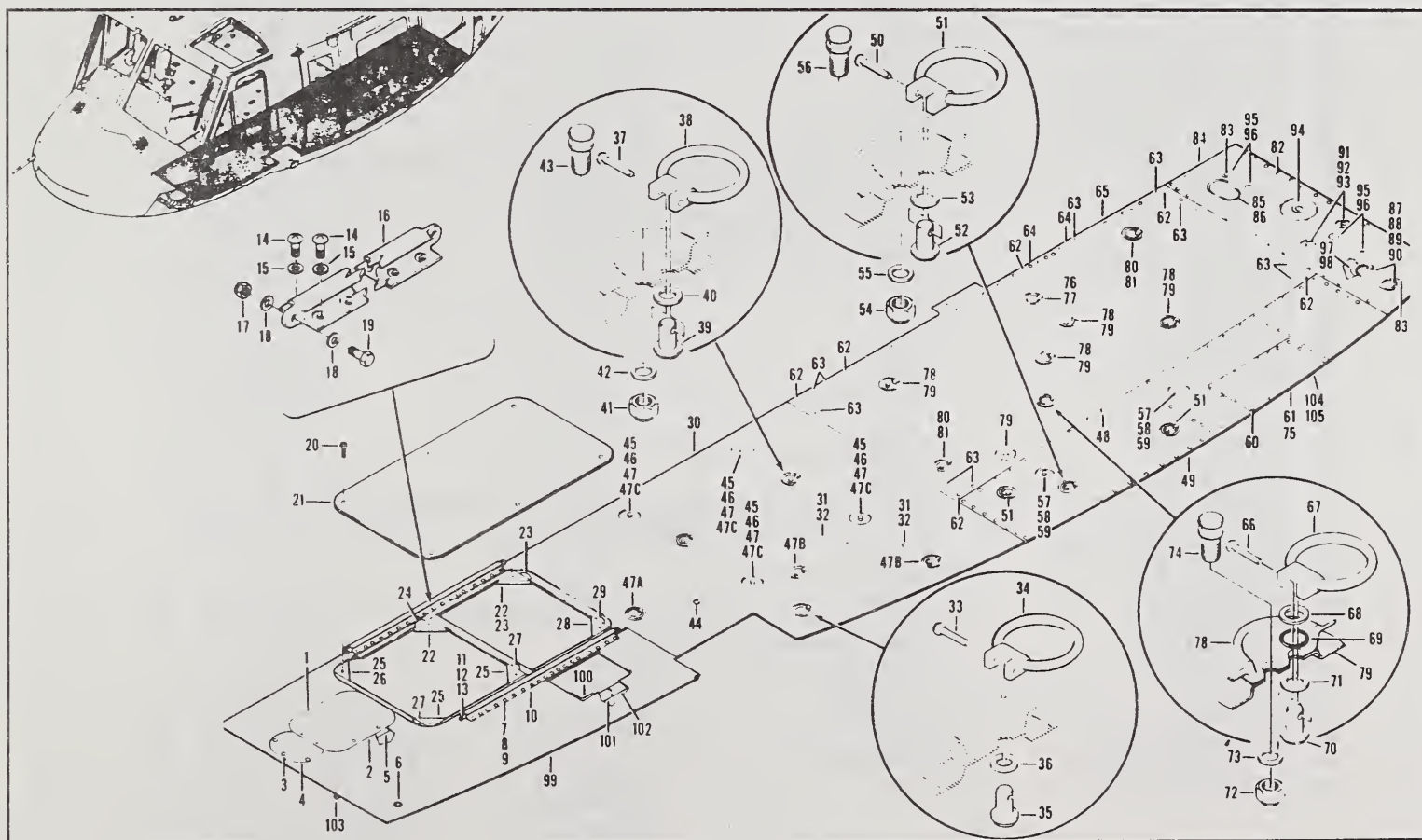


Figure 19. Bell 212 lefthand floor installation.

(1) FIGURE & INDEX NUMBER	(2) PART NUMBER	(3) DESCRIPTION	(4) UNIT PER ASSY	(5) MODELS USABLE ON			(6) NP
85 -	205-031-321-057	FLOOR INSTL, LH (SEE FIG. 83A FOR NHA) (S/N. 30504 THRU 30729)	REF				X
	205-031-321-045	FLOOR INSTL, LH (SEE FIG. 83A FOR NHA) (S/N. 30730 THRU 30849)	REF				X
	205-031-321-065	FLOOR INSTL, LH (SEE FIG. 83A FOR NHA) (S/N. 30850 AND SUB)	REF				X
- 1	MS35207-262	SCREW.....	6				
- 2	204-030-321-043	DOOR.....	1				
- 3	MS35207-263	SCREW.....	3				
- 4	204-030-337-003	DOOR.....	1				
- 5	204-030-330-009	DOUBLER ASSY.....	1				
- 6	MS35489-35	GROMMET.....	1				
- 7	MS27039-1-11	SCREW.....	36				
- 8	MS27039-1-09	SCREW.....	1				
- 9	AN960JD10L	WASHER.....	37				
- 10	212-030-198-005	TRACK ASSY.....	1				
- 11	MS21042L3	NUT.....	1				
- 12	AN960JD10L	WASHER.....	2				
- 13	AN3-4A	BOLT.....	1				
- 14	MS27039-1-11	SCREW.....	37				
- 15	AN960JD10L	WASHER.....	37				
- 16	212-030-198-001	TRACK ASSY.....	1				
- 17	MS21042L3	NUT.....	1				
- 18	AN960JD10L	WASHER.....	2				
- 19	AN3-4A	BOLT.....	1				
- 20	MS27039-4-08	SCREW.....	6				
- 21	212-030-250-001	DOOR ASSY.....	1				
- 22	212-030-249-001	GUSSET.....	2				X
- 23	212-030-249-007	FILLER.....	2				
- 24	212-030-249-009	FILLER.....	1				
- 25	212-030-249-005	GUSSET.....	3				
- 26	212-030-249-011	FILLER.....	1				
- 27	212-030-249-013	FILLER.....	2				
- 28	212-030-249-003	GUSSET.....	1				
- 29	212-030-249-015	FILLER.....	1				
- 30	205-031-332-009	FLOOR PANEL ASSY.....	1				
- 31	P102F10-1	PLUG (82831) (REPLACED BY 80-011P10F1-0)	2				X
- 31	80-011P10F1-0	PLUG (REPLACES P102F10-1)	2				
- 32	S102F10-08	SLEEVE (82831) (REPLACED BY 80-011S10F08-0)	2				X
- 32	80-011S10F08-0	SLEEVE (REPLACES S102F10-08)	2				
- 33	MS20392-1C17	PIN.....	2				
- 34	110-056-1	RING ASSY.....	2				
- 35	100-051-1	PIN.....	2				
- 36	AN960PD516	WASHER.....	2				
- 37	MS20392-1C17	PIN.....	4				
- 38	110-056-1	RING ASSY.....	4				
- 39	100-051-1	PIN.....	4				
- 40	AN960PD516	WASHER.....	4				
- 41	MS21042L6	NUT.....	4				
- 42	AN960PD616	WASHER.....	4				
- 43	VBP69070	STUD (14821) (REPLACED BY 120-064-3HN)	4				X
- 43	120-064-3HN	STUD (REPLACES VBP69070)	4				
- 44	204-030-036-003	PLUG.....	1				
- 45	MS21042L6	NUT.....	4				
- 46	AN960PD616	WASHER.....	4				
- 47	VBP69070	STUD (14821) (REPLACED BY 120-064-3HN)	4				X
- 47	120-064-3HN	STUD (REPLACES VBP69070)	4				
- 47A	50-074-4	FITTING.....	2				
- 47B	50-074-3	FITTING.....	4				
- 47C	50-074-1	FITTING.....	4				
- 48	MS27039-1-07	SCREW.....	104				
- 49	212-030-188-001	PANEL ASSY.....	1				
- 50	MS20392-1C17	PIN.....	3				

Figure 20. Bell 212 lefthand floor hardware list.

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION	UNIT PER ASSY	MODELS USABLE ON	NP
85 - 51	110-056-1	.. RING ASSY.....	3		
- 52	100-051-1	.. PIN.....	3		
- 53	AN960D516	.. WASHER.....	3		
- 54	MS21042L6	.. NUT.....	3		
- 55	AN960D616	.. WASHER.....	3		
- 56	4159-2-11	.. STUD (99879).....	3		X
		(ALTERNATE PART)			
- 56	120-064-3HN	.. STUD.....	3		
- 57	MS21042L6	.. NUT.....	2		
- 58	AN960D616	.. WASHER.....	2		
- 59	4159-2-11	.. STUD (99879).....	2		X
		(ALTERNATE PART)			
- 60	120-064-3HN	.. STUD.....	AR		
- 61	MS27039-1-07	.. SCREW.....	17		
- 62	212-030-182-001	.. COVER.....	1		
- 63	AN525-10R10	.. SCREW.....	25		
- 64	AN525-10R8	.. SCREW.....	75		
- 65	AN525-10R9	.. SCREW.....	8		
- 66	205-031-257-067	.. FLOOR PANEL ASSY.....	1		
- 66	MS20392-1C17	.. PIN.....	8		
- 67	110-056-1	.. RING.....	8		
- 68	AN960-516L	.. WASHER.....	8		
- 69	AN8227B6	.. PACKING, PREFORMED.....	8		
- 70	100-051-1	.. PIN (00000).....	8		
- 71	AN960PD516L	.. WASHER.....	8		
- 72	MS21042L6	.. NUT.....	7		
- 73	AN960PD616	.. WASHER.....	7		
- 74	VBP69070	.. STUD (14821).....	7		X
		(ALTERNATE PART)			
- 75	120-064-3HN	.. STUD.....	7		
- 76	205-031-257-073	.. FILLER ASSY.....	1		
- 77	50-074-4	.. FITTING.....	1		
- 78	205-031-259-003	.. ADAPTER.....	1		
- 79	50-074-3	.. FITTING.....	5		
- 80	205-031-259-001	.. ADAPTER.....	6		
- 81	50-074-1	.. FITTING.....	2		
- 82	205-031-259-005	.. ADAPTER.....	2		
- 83	MS27039-1-07	.. SCREW.....	38		
- 84	MS27039-0813	.. SCREW.....	8		
- 85	205-032-147-077	.. FLOOR PANEL ASSY.....	1		
- 86	MS24694S55	.. SCREW.....	4		
- 87	205-062-618-015	.. COVER ASSY.....	1		
- 88	MS20392-1C17	.. PIN.....	2		
- 89	110-056-1	.. RING ASSY.....	2		
- 90	100-051-1	.. PIN (00000).....	2		
- 91	AN960D516	.. WASHER.....	2		
- 92	MS21042L6	.. NUT.....	2		
- 93	AN960PD616	.. WASHER.....	2		
- 94	VBP69070	.. STUD (14821).....	2		X
		(ALTERNATE PART)			
- 95	120-064-3HN	.. STUD.....	2		
- 96	205-032-150-001	.. BEARING SEAL.....	1		
- 97	205-032-147-041	.. PANEL ASSY.....	1		
- 98	P102D8-1	.. PLUG (82831).....	4		X
		(ALTERNATE PART)			
- 99	80-011P8D1-0	.. PLUG.....	4		
- 100	S102D8-08	.. SLEEVE (82831).....	4		X
		(ALTERNATE PART)			
- 101	80-011S8D08-0	.. SLEEVE.....	4		
- 102	50-074-1	.. FITTING.....	2		
- 103	205-031-350-002	.. FITTING.....	1		
- 104	205-031-200-003	.. FLOOR PANEL.....	1		
- 105	205-031-321-043	.. CLIP.....	1		
- 106	205-031-321-023	.. STIFFENER.....	1		
- 107	205-031-321-025	.. STIFFENER.....	1		
- 108	205-031-321-021	.. STIFFENER.....	1		
- 109	212-030-181-001	.. PAN ASSY.....	1		
- 110	MS21209F1-15	.. INSERT.....	17		

Figure 21. Bell 212 lefthand floor hardware list, continued.

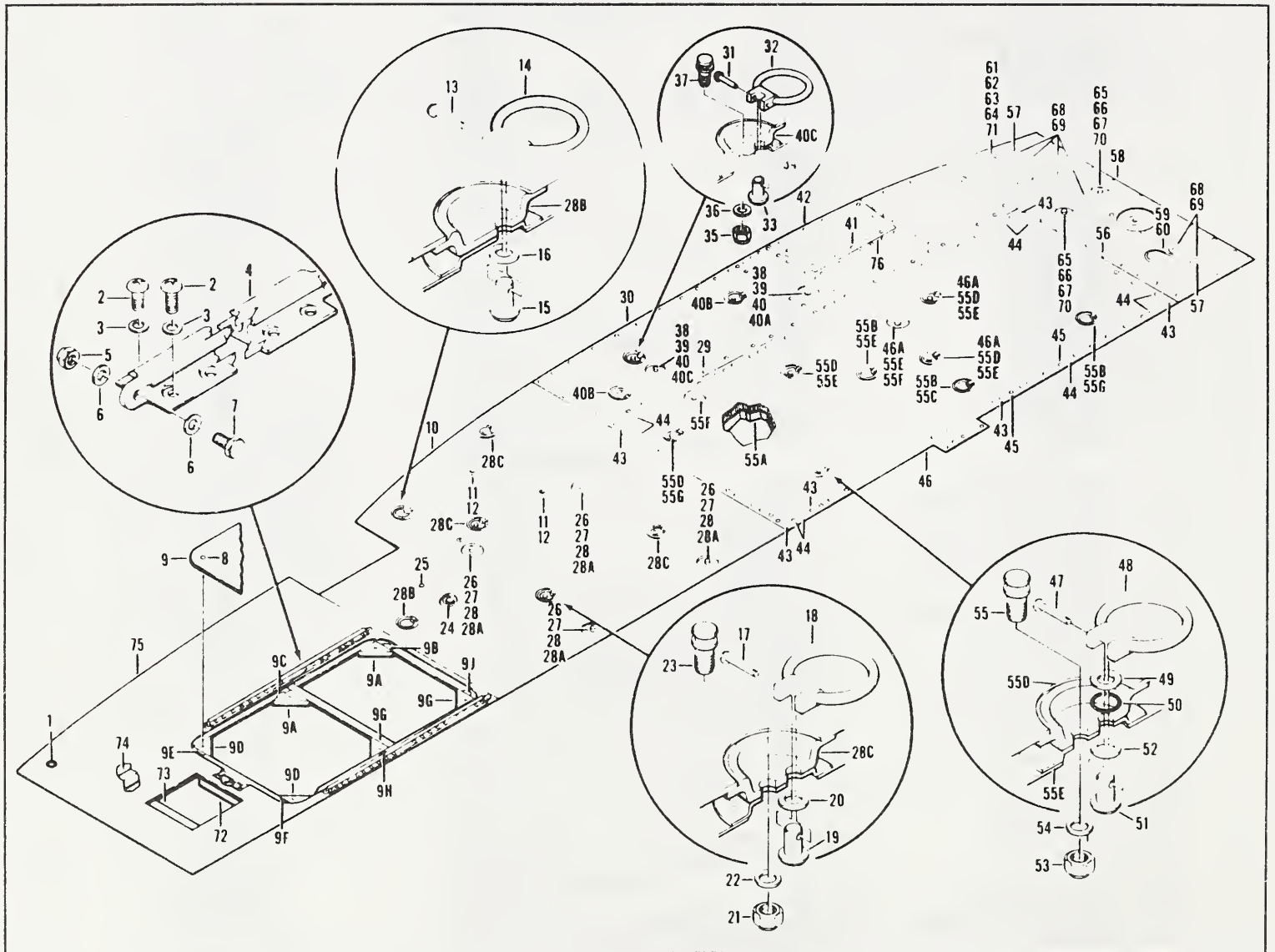


Figure 22. Bell 212 righthand floor installation.

FIGURE INDEX NUMBER	PART NUMBER	DESCRIPTION	UNIT PER ASSY	MODELS USABLE ON			NP
86 -	205-031-320-041	FLOOR INSTL,RH (SEE FIG. 83A FOR NHA) (S/N.. 30504 THRU 30729)	REF				X
	205-031-320-047	FLOOR INSTL,RH (SEE FIG. 83A FOR NHA) (S/N.. 30730 THRU 30849)	REF				X
	205-031-320-053	FLOOR INSTL,RH (SEE FIG. 83A FOR NHA) (S/N.. 30850 AND SUB)	REF				X
- 1	MS35489-35	GROMMET	1				
- 2	MS27039-1-09	SCREW	74				
- 3	AN960JD10L	WASHER	74				
- 4	212-030-198-001	TRACK ASSY	2				
- 5	MS21042L3	NUT	1				
- 6	AN980JD10L	WASHER	2				
- 7	AN3-4A	BOLT	1				
- 8	MS27039-4-08	SCREW	6				
- 9	212-030-250-001	DOOR ASSY	1				
- 10	212-030-249-003	GUSSET (USBL ON 205-031-320-41,-47)	2				
- 11	212-030-249-015	FILLER (USBL ON 205-031-320-41,-47)	1				
- 12	212-030-249-011	FILLER	1				
- 13	212-030-249-005	GUSSET	2				
- 14	212-030-249-013	FILLER	1				
- 15	212-030-249-011	FILLER	1				
- 16	212-030-249-002	GUSSET	2				
- 17	212-030-249-009	FILLER	1				
- 18	212-030-249-007	FILLER (USBL ON 205-031-320-41,-47)	1				
- 19	205-031-332-011	FLOOR PANEL ASSY	1				
- 20	P102F10-1	PLUG (82831) (REPLACED BY 80-011P10F1-0)	2				X
- 21	80-011P10F1-0	PLUG (REPLACES P102F10-1)	2				
- 22	S102F10-08	SLEEVE (82831) (REPLACED BY 80-011S10F08-0)	2				X
- 23	80-011S10F08-0	SLEEVE (REPLACES S102F10-08)	2				
- 24	MS20392-1C17	PIN	2				
- 25	110-056-1	RING	2				
- 26	100-051-1	PIN	2				
- 27	AN960PD516	WASHER	2				
- 28	MS20392-1C17	PIN	4				
- 29	110-056-1	RING ASSY	4				
- 30	100-051-1	PIN	4				
- 31	AN960PD516	WASHER	4				
- 32	MS21042L6	NUT	4				
- 33	AN960PD616	WASHER	4				
- 34	VBP69070	STUD (14821) (REPLACED BY 120-064-3HN)	4				X
- 35	120-064-3HN	STUD (REPLACES VBP69070)	4				
- 36	204-030-036-003	PLUG	1				
- 37	204-030-036-005	PLUG	1				
- 38	MS21042L6	NUT	4				
- 39	AN960PD616	WASHER	4				
- 40	VBP69070	STUD (14821) (REPLACED BY 120-064-3HN)	4				X
- 41	120-064-3HN	STUD (REPLACES VBP69070)	4				
- 42	50-074-1	FITTING	4				
- 43	50-074-4	FITTING	2				
- 44	50-074-3	FITTING	4				
- 45	MS27039-1-07	SCREW	104				
- 46	212-030-188-002	FLOOR PANEL ASSY (USBL ON 205-031-320-41,-47)	1				
- 47	MS20392-1C17	PIN	3				
- 48	110-056-1	RING ASSY	3				
- 49	100-051-1	PIN	3				
- 50	AN960D516	WASHER	3				
- 51	MS21042L6	NUT	3				
- 52	AN960D616	WASHER	3				
- 53	VBP69070	STUD (14821) (REPLACED BY 120-064-3HN)	3				X
- 54	120-064-3HN	STUD (REPLACES VBP69070)	3				
- 55	MS21042L6	NUT	2				
- 56	AN960D616	WASHER	2				

Figure 23. Bell 212 righthand floor hardware list.

(1) FIGURE & INDEX NUMBER	(2) PART NUMBER	(3) DESCRIPTION	(4) UNIT PER ASSY	(5) MODELS USABLE ON			(6) NP
86 - 4C	4159-2-11	.. STUD (99879)	2				X
		(ALTERNATE PART)					
	VBP69070	.. STUD (14821) (REPLACED BY 120-064-3HN)	AR				X
- 4	120-064-3HN	.. STUD (REPLACES VBP69070)	2				
- 4CA	50-074-1	.. FITTING	1				
- 4CJ	50-074-3	.. FITTING	2				
- 4CZ	212-030-182-002	.. FITTING	1				
- 41	MS27039-1-07	.. SCREW	17				
- 42	212-030-182-002	.. COVER	1				
- 43	AN525-10R10	.. SCREW	26				
- 44	AN525-10R8	.. SCREW	74				
- 45	AN525-10R9	.. SCREW	6				
- 46	205-031-257-068	.. FLOOR PANEL ASSY	1				
- 46A	205-031-225-001	.. COVER	3				
- 47	MS20392-1C17	.. PIN	8				
- 4	110-056-1	.. RING ASSY	8				
- 4	AN960-516L	.. WASHER	8				
- 5	AN622786	.. PACKING, PREFORMED	8				
- 5	100-051-1	.. PIN	8				
- 5A	AN960PD516L	.. WASHER	8				
- 5B	MS21042L6	.. NUT	7				
- 5C	AN960PD616	.. WASHER	7				
- 5D	120-064-3HN	.. STUD	7				
- 55A	205-031-257-074	.. FILLER ASSY	1				
- 55B	50-074-4	.. FITTING	1				
- 55C	205-031-259-003	.. ADAPTER	1				
- 55D	50-074-3	.. FITTING	5				
- 55E	205-031-259-001	.. ADAPTER	6				
- 55F	50-074-1	.. FITTING	2				
- 55G	205-031-259-005	.. ADAPTER	2				
- 56	MS27039-1-07	.. SCREW	38				
- 57	MS27039-0813	.. SCREW	8				
- 58	205-032-147-079	.. FLOOR PANEL ASSY	1				
- 59	MS24694S55	.. SCREW	4				
- 6C	205-062-618-015	.. COVER ASSY	1				
- 6	MS20392-1C17	.. PIN	2				
- 6A	110-056-1	.. RING ASSY	2				
- 6B	100-051-1	.. PIN	2				
- 6A	AN960D516	.. WASHER	2				
- 6B	MS21042L6	.. NUT	2				
- 6C	AN960PD616	.. WASHER	2				
- 6	VBP69070	.. STUD (14821) (REPLACED BY 120-064-3HN)	2				X
- 6	120-064-3HN	.. STUD (REPLACES VBP69070)	2				
- 6A	205-032-147-059	.. PANEL ASSY	1				
- 6B	P102D8-1	.. PLUG (82831)	6				X
		(ALTERNATE PART)					
- 68	80-011P8D1-0	.. PLUG	AR				
- 69	S102D8-08	.. SLEEVE (82831)	6				X
		(ALTERNATE PART)					
- 69	80-011S8D08-0	.. SLEEVE	6				
- 70	50-074-1	.. FITTING	2				
- 71	205-031-350-002	.. FITTING	1				
- 72	204-031-330-001	.. DOUBLER ASSY	1				
- 7	204-031-330-005	.. DOUBLER	1				
- 7A	205-030-115-003	.. STIFFENER	1				
- 7B	205-030-114-003	.. PANEL	1				
- 7C	212-030-181-002	.. CASTING	1				

Figure 24. Bell 212 righthand floor hardware list, continued.

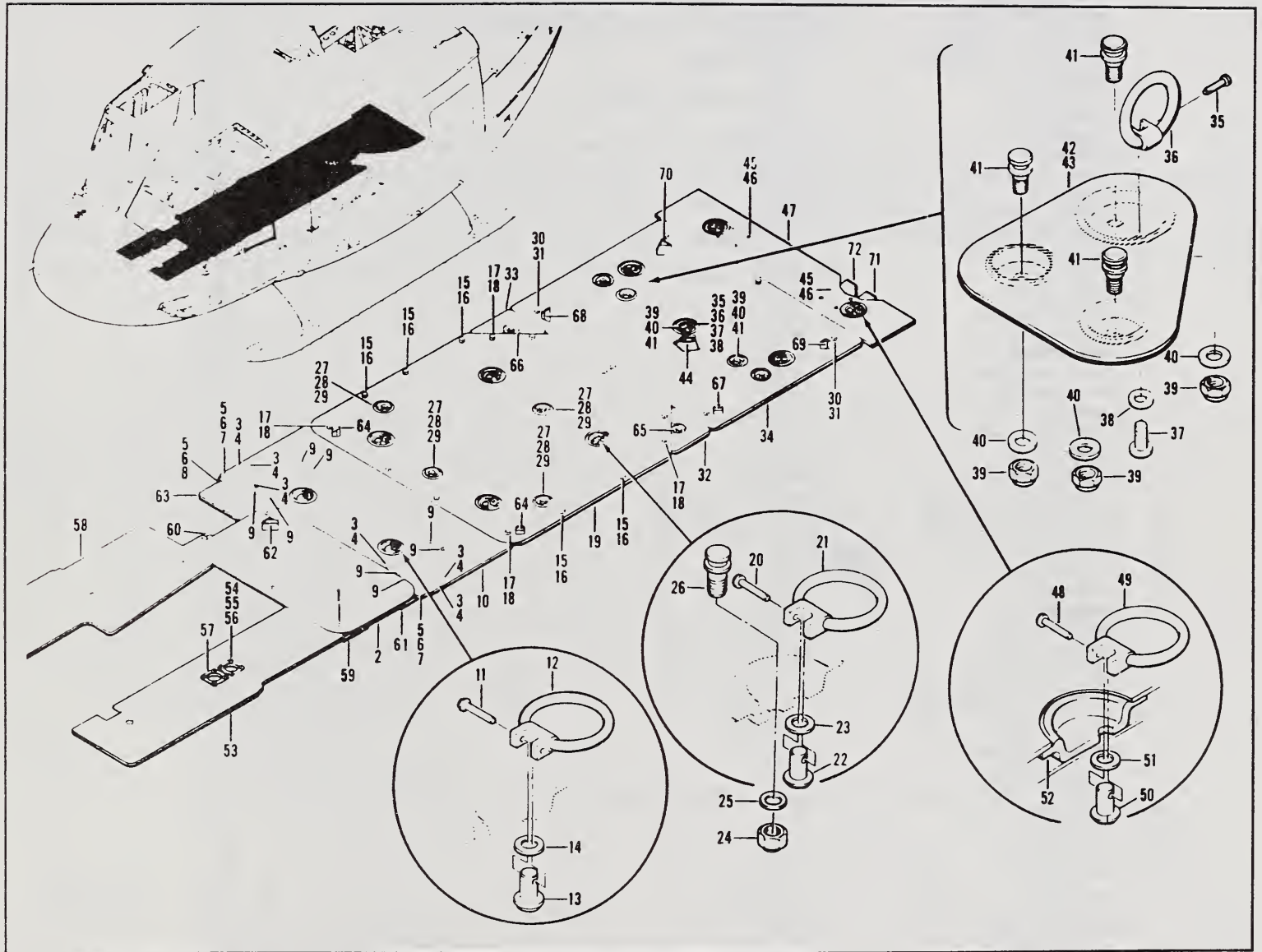


Figure 25. Bell 212 floor installation.

1 FIGURE INDEX NUMBER	2 PART NUMBER	3 DESCRIPTION	4 UNIT PER ASSY	5 MODELS USABLE ON	6 NP
92 -	205-031-322-015	FLOOR INSTL (SEE FIG. 81 FOR NHA)	REF		X
- 1	AN525-416R8	.. SCREW	6		
- 2	205-030-314-001	.. DOOR ASSY	1		
-	AN525-10R9	.. SCREW	6		
-	AN960JD10L	.. WASHER	6		
-	MS21042L3	.. NUT	3		
-	AN960JD10L	.. WASHER	3		
-	AN525-10R9	.. SCREW	2		
-	MS27039-1-09	.. SCREW	1		
-	MS27039-1-08	.. SCREW	8		
-	205-031-258-005	.. PANEL ASSY	1		
- 1	MS20392-1C17	.. PIN	2		
- 2	FDA1886M1	.. RING ASSY (98313)	2		X
- 3	100-051-1	.. PIN	2		
- 4	AN960D516	.. WASHER	2		
- 5	AN4-5A	.. BOLT	5		
- 6	AN960JD416L	.. WASHER	5		
- 7	AN4-4A	.. BOLT	9		
- 8	AN960JD416L	.. WASHER	9		
- 9	205-031-324-007	.. DOOR ASSY	1		
- 10	MS20392-1C17	.. PIN	4		
- 11	100-056-1	.. RING ASSY	4		
- 12	100-051-1	.. PIN	4		
- 13	AN960PD516	.. WASHER	4		
- 14	MS21042L6	.. NUT	4		
- 15	AN960PD616	.. WASHER	4		
- 16	120-064-3HN	.. STUD	4		
- 17	MS21042L6	.. NUT	4		
- 18	AN960JD416	.. WASHER	4		
- 19	120-064-3HN	.. STUD	4		
- 20	AN4-4A	.. BOLT	6		
- 21	AN960JD416L	.. WASHER	6		
- 22	205-030-322-067	.. PANEL ASSY, LH	1		
- 23	205-030-322-068	.. PANEL ASSY, RH	1		
- 24	205-031-326-005	.. DOOR ASSY	1		
- 25	MS20392-1C17	.. PIN	3		
- 26	110-056-1	.. RING ASSY	3		
- 27	100-051-1	.. PIN	3		
- 28	AN960PD516	.. WASHER	3		
- 29	MS21042L6	.. NUT	7		
- 30	AN960PD616	.. WASHER	7		
- 31	120-064-3HN	.. STUD	7		
- 32	212-030-157-003	.. FITTING	1		
- 33	212-030-157-004	.. FITTING	1		
- 34	50-074-3	.. FITTING	1		
- 35	AN525-10R16	.. SCREW	8		
- 36	AN960JD10L	.. WASHER	8		
- 37	205-031-244-005	.. PANEL ASSY, FLOOR	1		
- 38	MS20392-1C17	.. PIN	2		
- 39	110-056-1	.. RING ASSY	2		
- 40	100-051-1	.. PIN	2		
- 41	AN960PD516	.. WASHER	2		
- 42	50-074-4	.. FITTING	2		
- 43	205-030-322-083	.. FLOOR ASSY	1		
- 44	MS21042L06	.. NUT	8		
- 45	AN960JD6L	.. WASHER	8		
- 46	MS35206-229	.. SCREW	8		
- 47	204-031-322-059	.. COVER	2		
- 48	205-030-322-087	.. FLOOR ASSY	1		
- 49	205-030-370-007	.. GUSSET	1		
- 50	205-030-370-011	.. GUSSET	1		
- 51	205-030-370-005	.. GUSSET	1		
- 52	205-030-370-009	.. GUSSET	1		
- 53	205-030-260-005	.. STIFFENER	1		

Figure 26. Bell 212 floor hardware list.

FIGURE & INDEX NUMBER	PART NUMBER	DESCRIPTION	4 UN- PER ASSY	5 MODELS USABLE ON	6 NP
92 - 64	205-030-370-001	GUSSET	2		
- 65	205-030-264-001	GUSSET ASSY	1		
- 66	205-030-264-002	GUSSET ASSY	1		
- 67	205-030-370-003	GUSSET	1		
- 68	205-030-370-004	GUSSET	1		
- 69	205-030-370-015	GUSSET	1		
- 70	205-030-370-016	GUSSET	1		
- 71	205-031-243-001	SUPPORT FITTING	2		
- 72	205-031-243-002	SUPPORT FITTING	2		

Figure 27. Bell 212 floor hardware list, continued.

BELL 206

Per correspondence from Bell Helicopter Textron, the seat belt attach fittings are structural tie-down points. Load capability of these points was not provided by Bell Helicopter. Figure 28 shows station numbers and lateral and vertical location of these fittings for both the 206B and 206L ships. The fittings are designated Bell 206-031-104-1, -2 (LH outboard, RH outboard) and -3, -4 (LH inboard, RH inboard), respectively, for the 206B (see item 12 and 13 in figure 29), and Bell 206-032-121 fittings for the 206L series (see item 12 in figure 30).

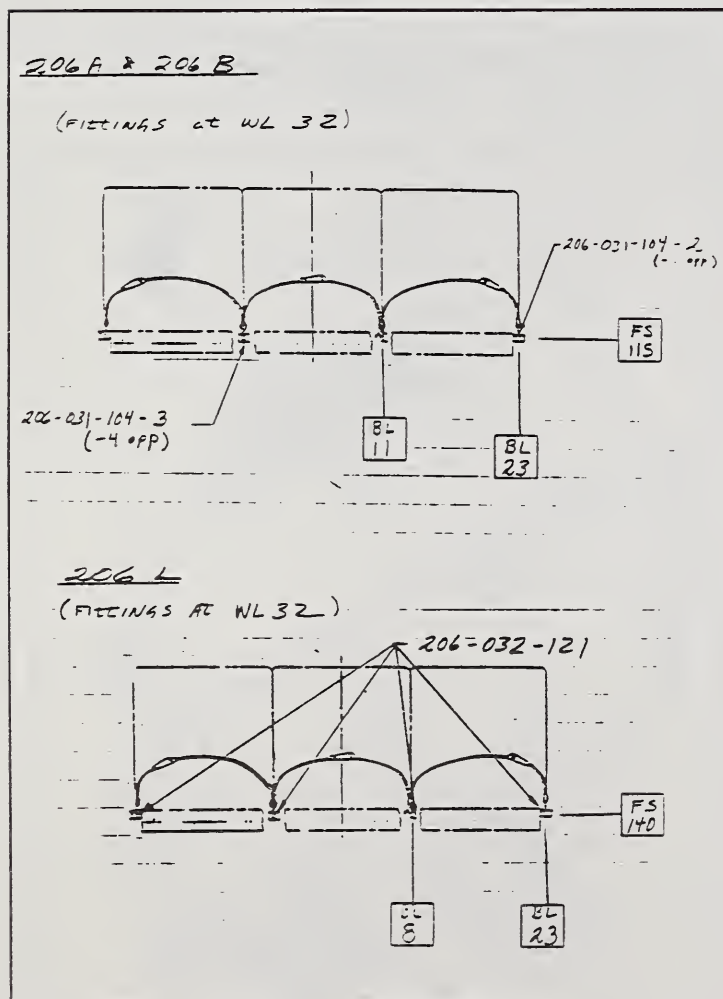


Figure 28. Bell 206 seat belt attach fittings.

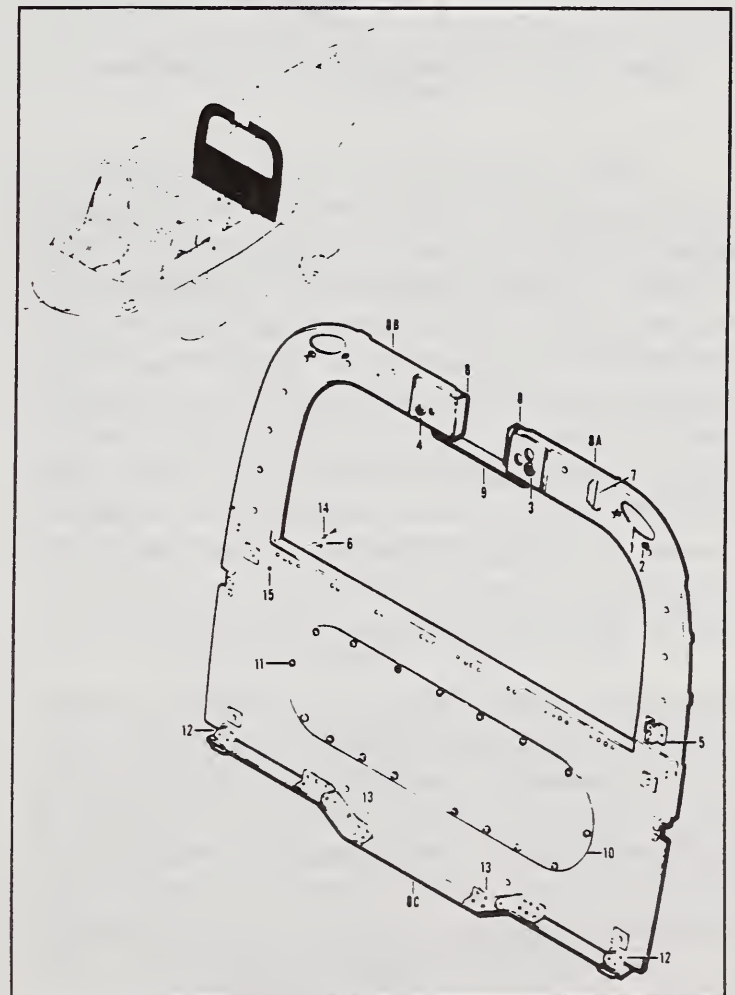


Figure 29. Bell 206B passenger seat panel installation.

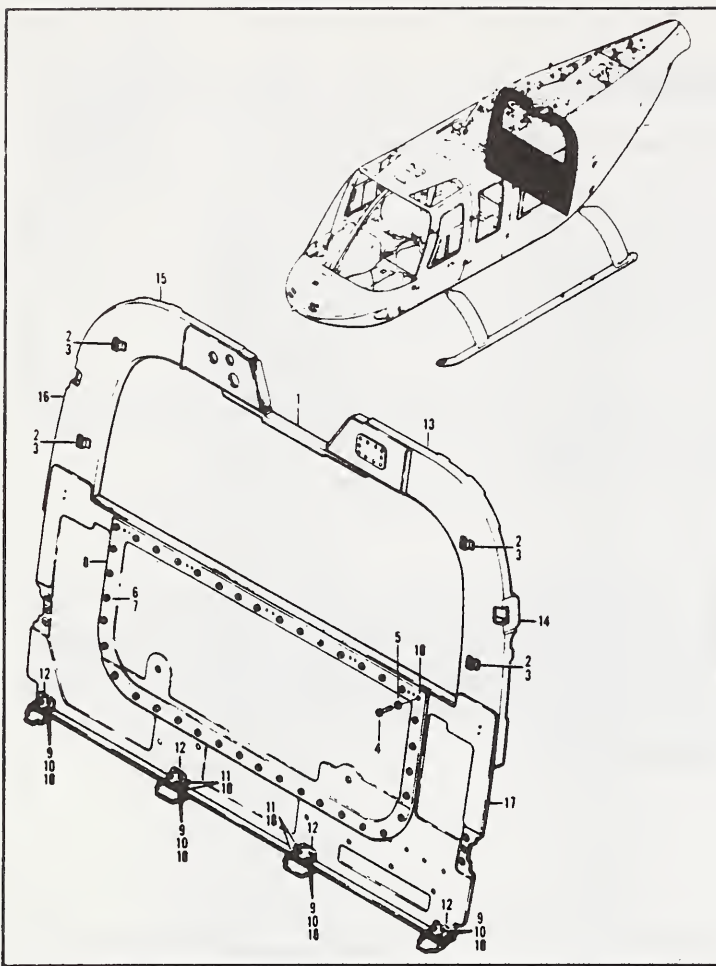


Figure 30. Bell 206L passenger seat back bulkhead installation.

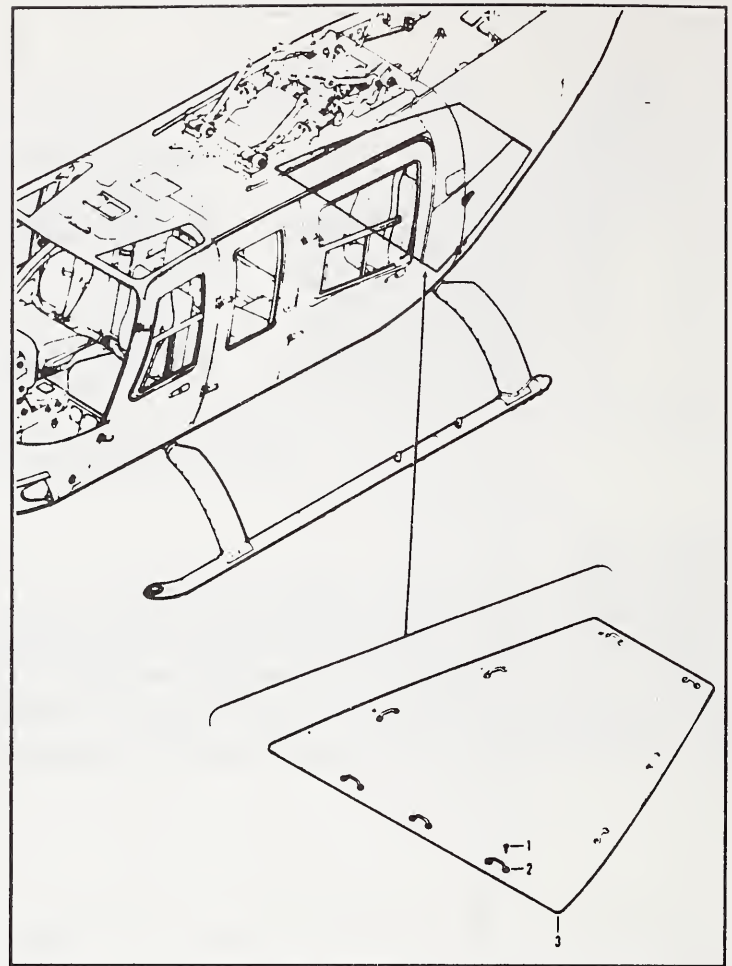


Figure 31. Bell 206L baggage compartment floor installation.

From the Bell parts catalogs, there are six tiedowns on the baggage compartment floor of the 206B and nine for the 206L series. Figure 31 shows the 206L3 baggage compartment floor. The tiedowns are footman loops (P/N 90-009-4) attached to the floor with two MS24694S47 screws per loop (same hardware for all 206 series). The 206B also has four footman loops on the baggage compartment bulkhead at station 130 (see figure 32). Bell literature did not indicate tiedown strengths; however, the baggage compartment floor cargo tiedowns for the 206B military equivalent OH-58 have a strength of 2100 lb according to Army TM 55-1520-228-10.

The cargo floor load capability of the baggage compartment of Bell 206 series helicopters is 86 lb/ft²; the cabin floor and seat benches can withstand 75 lb/ft² according to Bell product data books. For 206L series helicopters fitted with the cargo hook kit, there are two fittings attached to existing holes in the rear passenger seat bulkhead with MS27039-1-08 screws (four per fitting) at B.L. 8.00 left and right, and approximately station 121.4 (figures 33 and 34). These fittings are slightly different for the 206L versus the 206L-1/-3, but use the same MS screws.

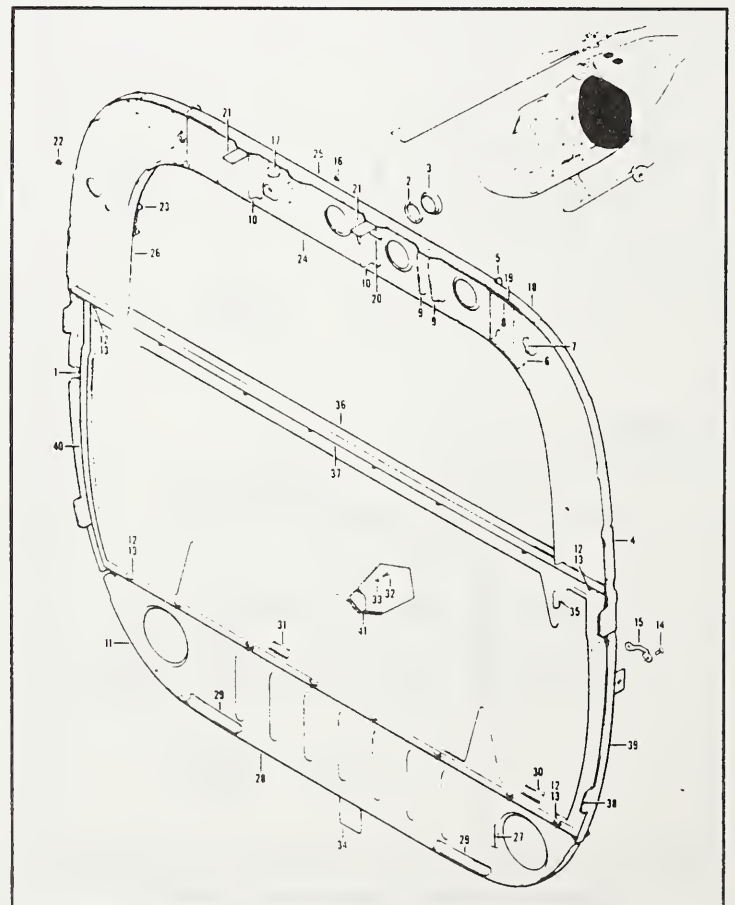


Figure 32. Bell 206B bulkhead installation at STA 130.

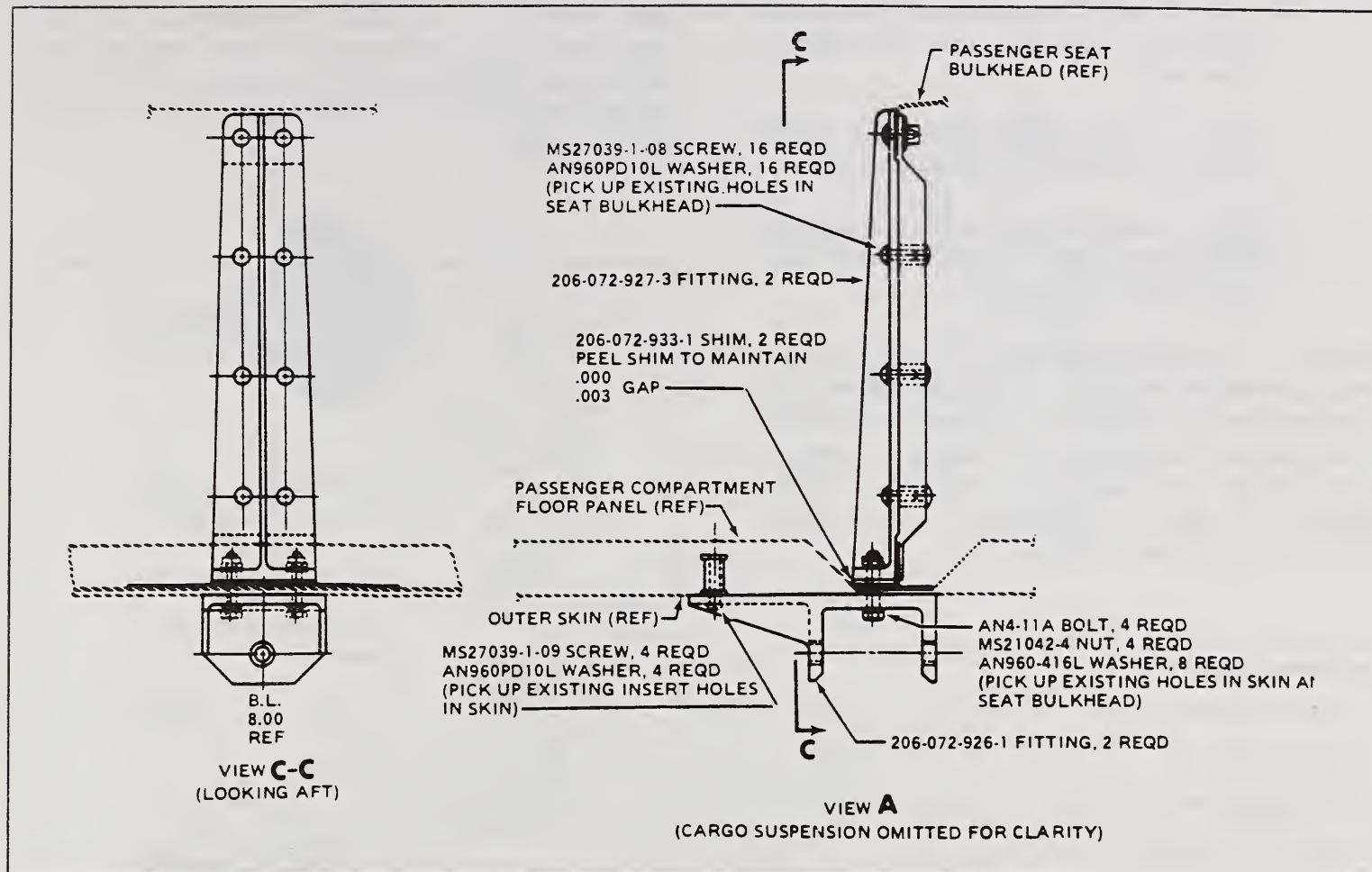


Figure 33. Bell 206L cargo hook installation.

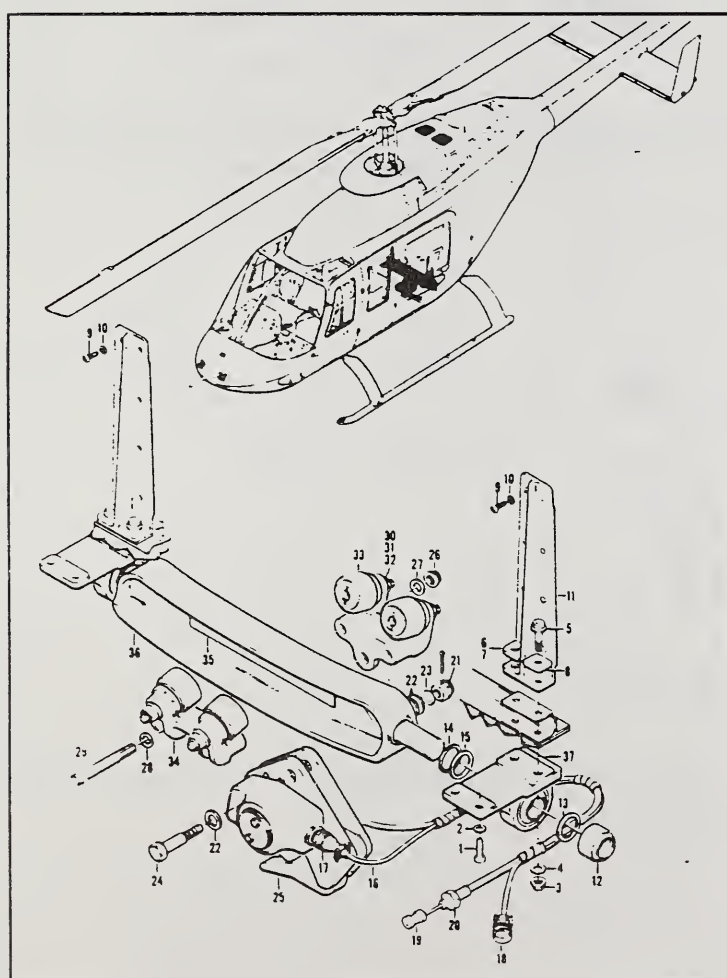


Figure 34. Bell 206L cargo hook auxiliary equipment kit.

Mc DONNELL DOUGLAS MD500D AND MD500E

Detailed internal hardpoint information for the MD500D and MD500E helicopters was not provided by McDonnell Douglas Aircraft. However, the following information was obtained from Hughes Helicopters "500D Pilot's Flight Manual" (May 15, 1977), and from the U.S. Army OH-6 technical manual: (**Note:** The Army OH-6 is the equivalent of the MD500C; however, the 500C, 500D and 500E are quite similar in the cargo compartment, according to Army Aviation Systems Command personnel.)

- Rope, cable, or equivalent must have a minimum loop strength of 1,800 pounds.
- Restrain the cargo from shifting by using the correct number of restraining loops in accordance with table 6-4. (figure 35).
- Position restraining loop in accordance with figure 6-7. (figure 36).
- Cargo deck capacity is 1300 lb (not to exceed 115 lb per ft²).
- View II shows typical tiedown for 500-pound cargo. (See figure 36)

- Restraining loops are to be secured as indicated and tied to the cargo to prevent slippage of the loops.
- Variations of the tiedown are allowable, providing total restraint requirements are met.
- Caution should be exercised to keep the cargo from bearing against the center slanted portion of the aft bulkhead.

The floor of the cargo compartment is a flat plate with laterally oriented hat sections. Each outboard end of the hat section has a hole drilled horizontally through the hat section with a pit pin and tie-down fitting assembly attached through each hole (figures 37 and 38). Station numbers of the cargo tie-downs (locations of hat sections) for the OH-6 are shown in figure 38.

6-8. INTERNAL CARGO LOADING

- The following should be adhered to when carrying cargo internally.
- • Rope, cable, or equivalent must have a minimum loop strength of 1,800 pounds.
- • Restrain the cargo from shifting, using the correct number of restraining loops in accordance with Table 6-4.
- • Position restraining loop in accordance with Figure 6-7.
- • Cargo deck capacity is 1300 pounds (not to exceed 115 pounds per square foot).
- • View II shows typical tiedown for 500-pound cargo.

Table 6-4. Cargo Weight Versus Loop Requirement

Cargo (lb)	Number of Required Restraint Loops		
	Forward Restraint	Aft Restraint	Vertical/Lateral Restraint
Up to 100	1	1	2
101 to 300	2	1	2
301 to 400	3	2	2
401 to 600	4	2	2
601 to 800	5	3	2
801 to 1000	6	3	3
1001 to 1100	7*	4	3
1101 to 1200	8*	4	3
1201 to 1300	8*	4	3

*Note the 7th and 8th loops are to use the outboard seat belt attach fitting (Station 124).

Figure 35. 500D Internal cargo loading.

Additional fittings found in the passenger/cargo area of the 500E are shown in figures 39 and 40. (**Note:** For the following fittings, -1 and -2 designate aircraft left and right respectively.) Item 16, figure 39, is designated fitting 369H3025-1, -2. Figure 40 locates the following fittings: Section A shows outboard seat support fitting 369H2509-1,-2; section B shows inboard seat support

fitting 369H2515-1, -2; section C shows seat belt fitting 369A2546-5 (1 ea.); and section D shows outboard seat belt fitting 368A2554-1, -2. [These fitting data taken from Hughes model 369E/F (MD 500E) Series IPC, Revised May 27, 1988.]

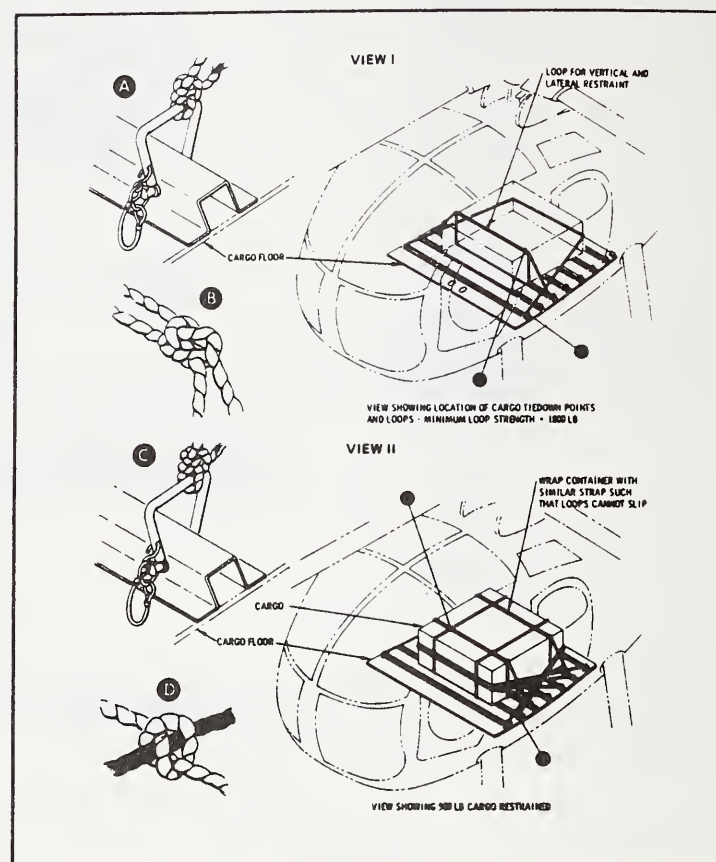


Figure 36. 500D Cargo restraint.

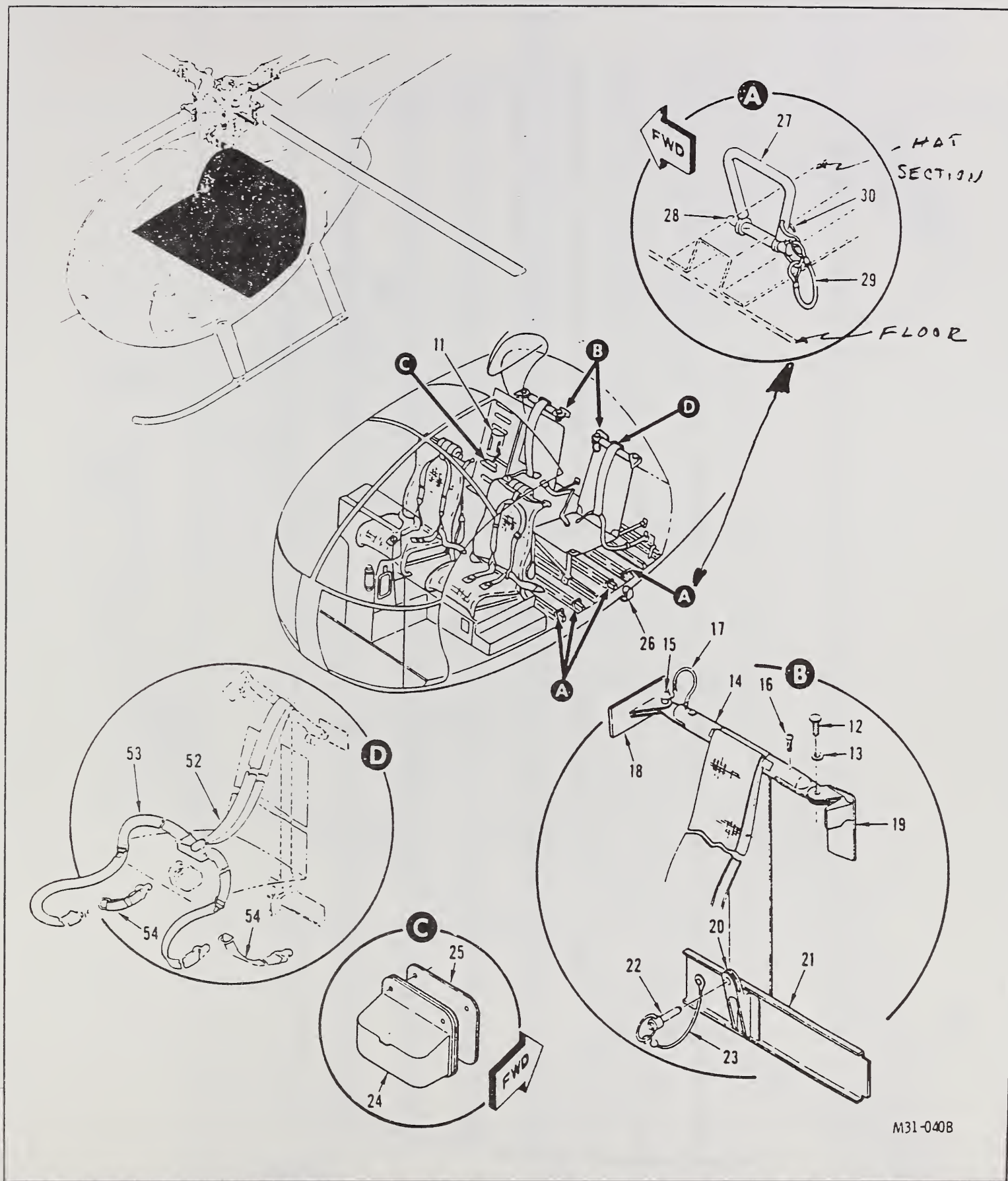


Figure 37. 500D Equipment installation.

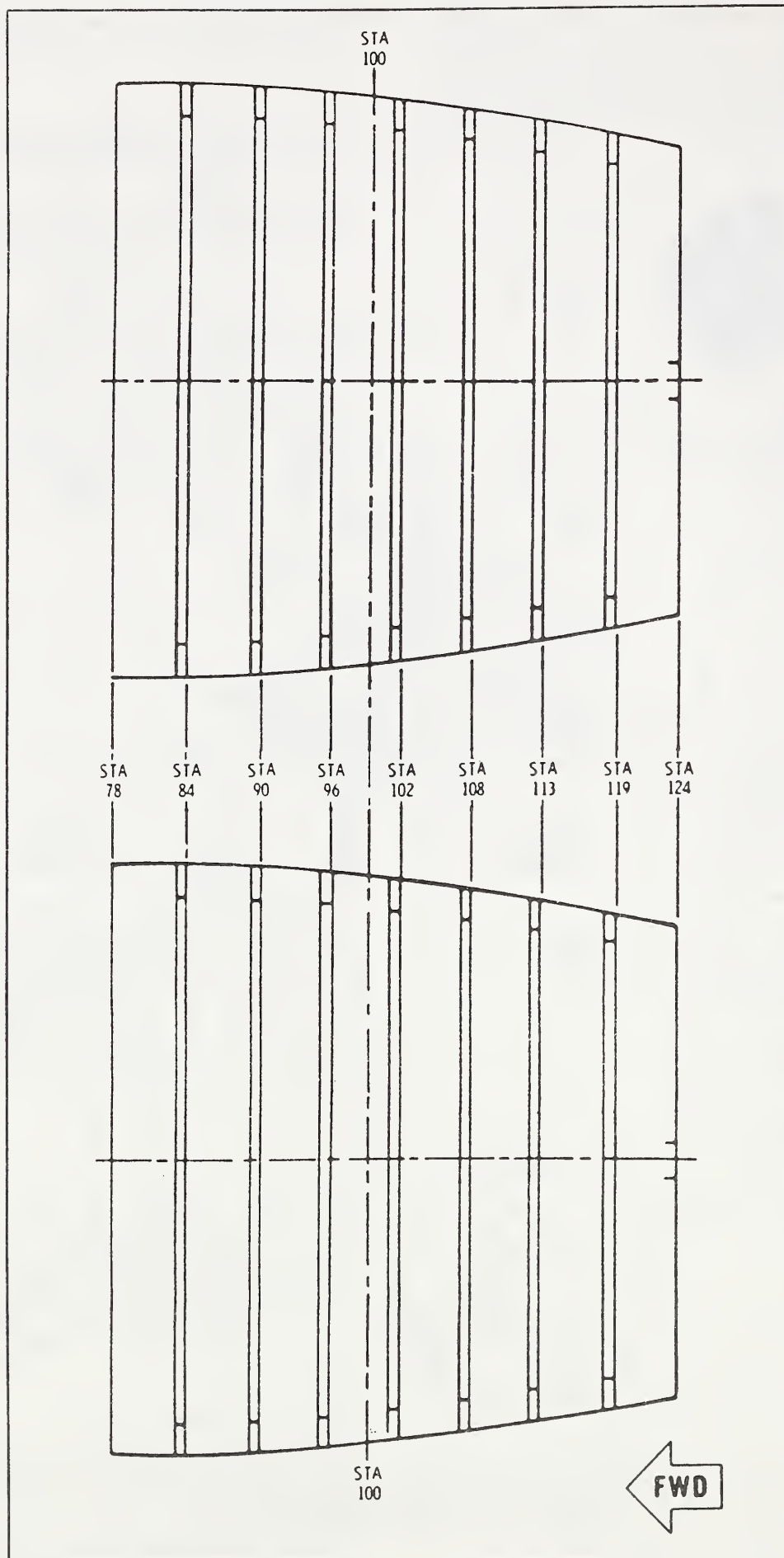


Figure 38. 500D Floor loading cg limit diagram.

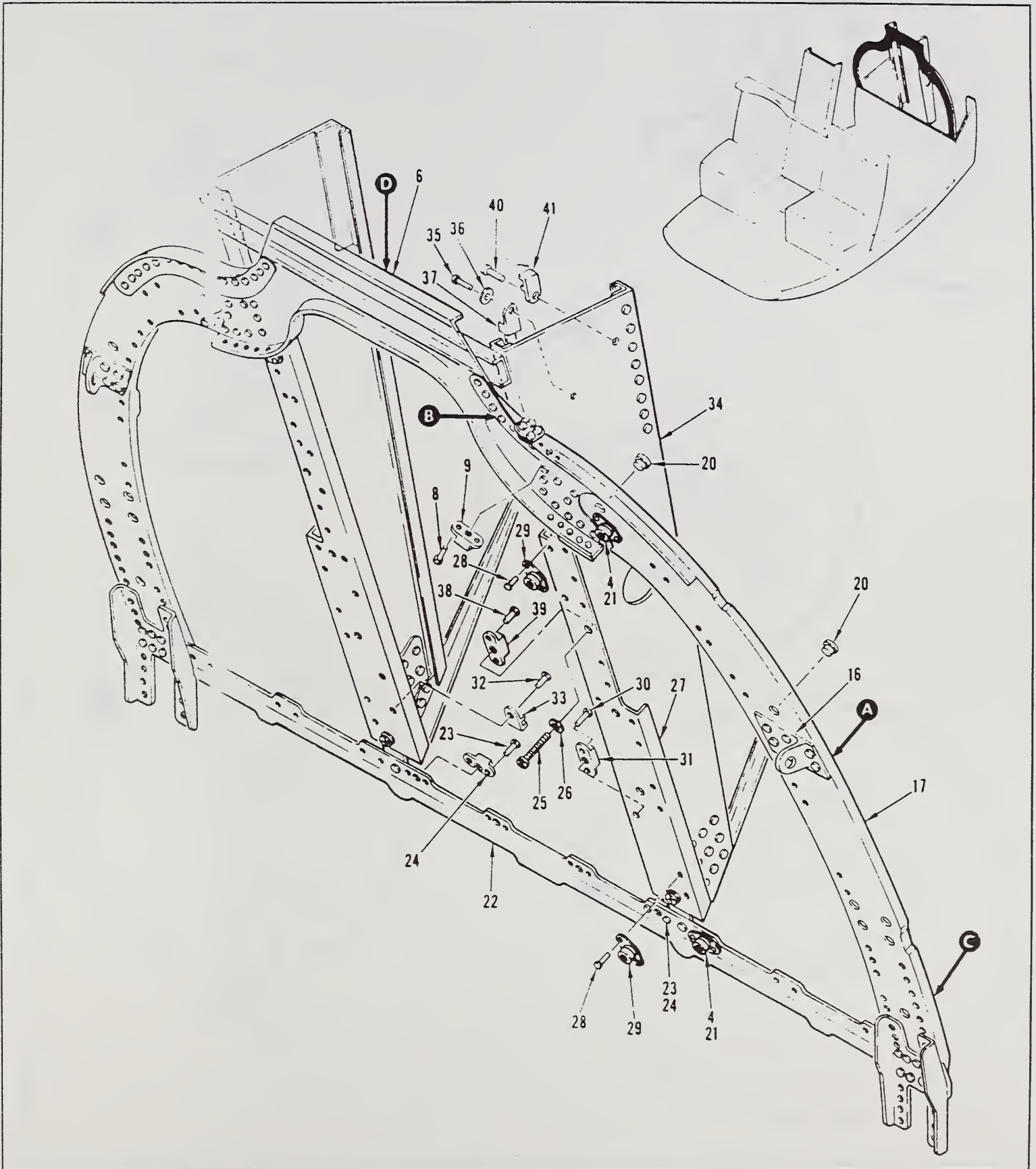


Figure 39. 500E Canted frame installation at STA 124.

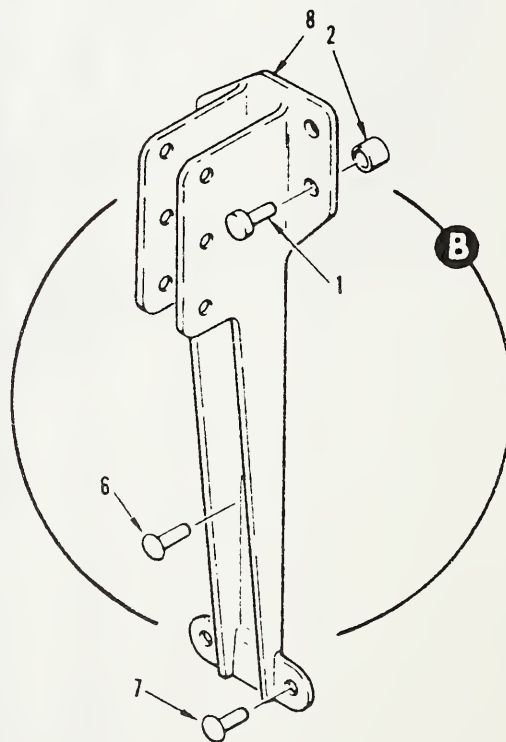
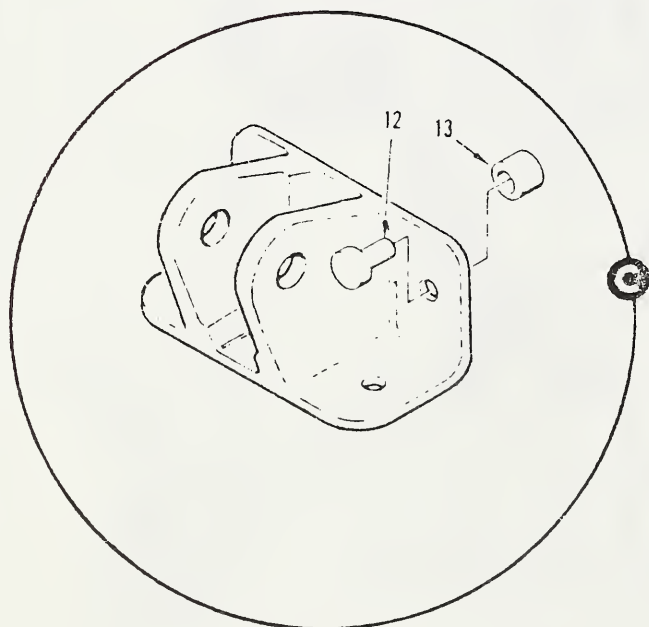
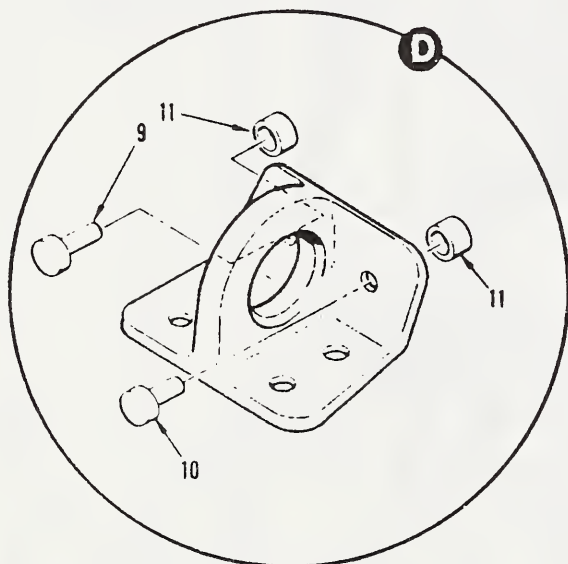
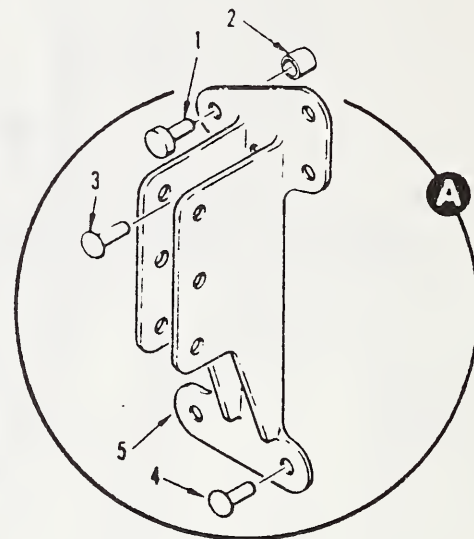
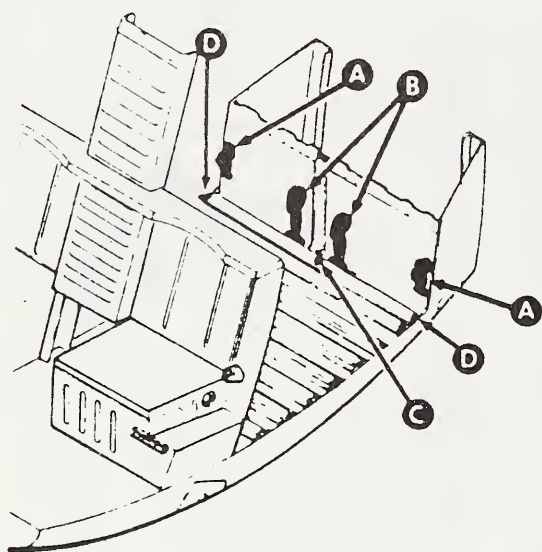


Figure 40. 500E Lower section frame installation.

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